MEPHAN FERGUSON,

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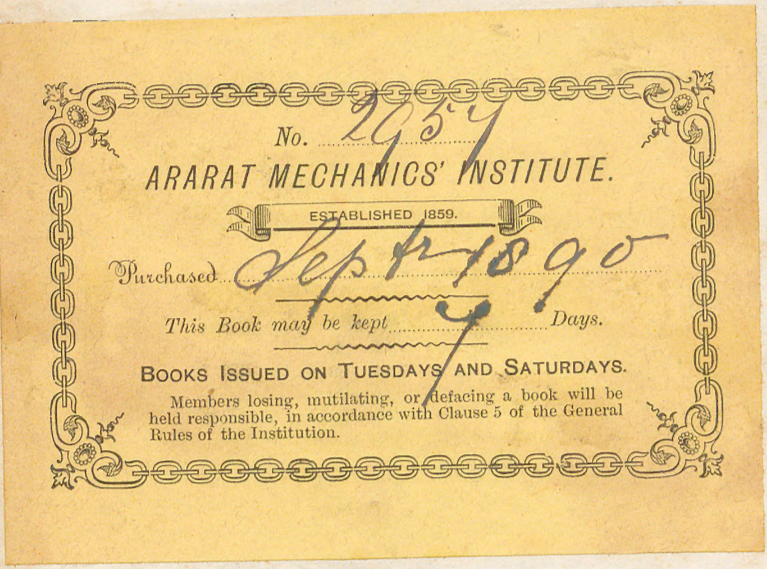

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OILS.	Blundell, Spence and Company's, W. Taylor and Company's, David Storer & Sons'.

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Register Grates, plain cast in great variety
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AND

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Used extensively for

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For Lifting Heavy Weights, their advantages are very great. They work noiselessly, and will not break without warning.

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Weight per Fathom, in lbs. ... 9	7	$4\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{3}{4}$
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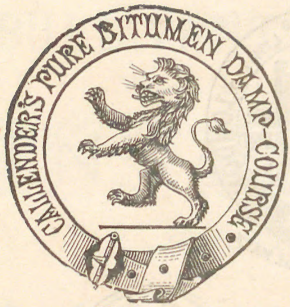
This cement received the gold medal at the International Exhibition of Paris in competition against all other celebrated brands of cement, and has been selected for use in many of the largest engineering works in Great Britain. Likewise in Australia it is now the leading brand.



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Is now most successfully and extensively used in London, where every house must, by the recent By-Laws of the Metropolitan Board of Works, be provided with a suitable damp course. Its advantages are as follows :—

It is elastic, and absolutely impervious to, or indestructible by damp, nor does it deteriorate under the action of lime.

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It is simple in application. Any ordinary labourer can lay it.

Whenever damp has to be combatted no more effective means of doing so can be found than it.

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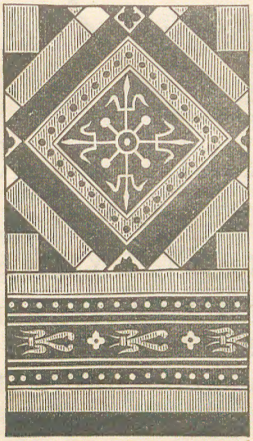
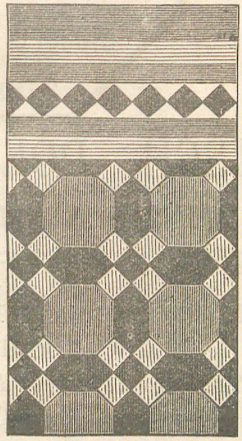
Importers of all descriptions of British and Continental Ornamental Tiles for Floors, and Walls.





Also, for Hearths, Church and House Decorations, Furniture, Skirtings, Borders, Friezes, &c.

Having SKILLED ARTISANS, they can now carry out Mosaic and Tesselated Designs equal to any work of the kind in England.

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Tiles imported to any Special Design

at a moderate advance upon manufacturers' prices.

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Patent Portable Expanding Trellis, planed both sides and of Superior Quality and thickness to any other kind imported.

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SOLE AGENTS FOR THE CROWN A1 CEMENT,
Label as above (our registered brand), Copy of Test on Page 15 of this Publication.

Sole Agents for the "STERN" OR "STAR" CEMENT,"
Full particulars on Page 96.

Sole Agents for the "FAUCUS" ENGLISH CEMENT,
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All the above Brands of Cement are of undeniable quality, and tests will compare to their advantage with any brands in the market.

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OF

ECCLESIASTICAL & DOMESTIC

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FOR

CHURCHES, PUBLIC BUILDINGS

AND

Dwelling Houses.

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OF EVERY DESCRIPTION.

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SAVE FROM 10 per cent. to 20 per cent.

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AND AT

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GALVANIZED IRON, RIDGING,
SPOUTING, BUILDERS' IRONMONGERY,
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AND

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GEORGE STREET, SYDNEY.

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FOR ALL DESCRIPTIONS OF

English, Continental, & American Hardware

MANUFACTURES.

Galvanized, Tinned, Corrugated

SHEET IRON.

Public attention is invited to this Iron as being of really excellent and uniform quality.

It is manufactured specially for F. Lassetter & Co., Ld., who are the Sole Importers.

The steadily increasing demand for Galvanized Tinned Iron of this celebrated brand, affords satisfactory evidence of the high estimation in which it is held by those who have given it a trial.

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OF EVERY DESCRIPTION.

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In Cut Crystal and Amber Glass, Brass Repousse, Steel Bronzed, Oak, Cocoa, Ebony, and Coloured Porcelain, with Finger Plates to match,

NEWEST DESIGNS OF HALL DOOR FURNITURE.

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Comprising Casement and Sash Fasteners and Lifts, Door Knockers and Knobs, Letter Plates, Hat and Coat Hooks, Bell Furniture, Catches, Latches, Shop Window and Bank Fittings.

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PUMPS of All Descriptions and Fittings.

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In Great Variety.

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GRANITE POLISHING WORKS,

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GALVANIZED AND BLACK TUBE FITTINGS.
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FOR TESTS, &c., SEE PAGE 97.

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INVITE THE SPECIAL ATTENTION OF

Architects, Builders and Contractors,

TO THEIR LARGE AND WELL-ASSORTED STOCK OF

BUILDERS' IRONMONGERY.

And from their many years' experience in this particular branch of their Business, also being Large Importers of

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Wood, Cast Iron Patent Columns and Verandah Work a Speciality.

W. ANDERSON AND SONS,
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Machinery may be Rented with the option of Purchase, Rents, &c., being reckoned as Part Payment.

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LOCOMOTIVES	EARTH WAGGONS
PORTABLE ENGINES	HOISTING ENGINES
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Every description of Agricultural, Pastoral, Mining, Sawing and Engineering Machinery.

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FIFTH EDITION, REVISED, ENLARGED, AND CORRECTED TO DATE.

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AND THE COST OF LABOUR ONLY
AT THE CURRENT RATE OF WAGES.

WITH ESSAYS ON THE

BUILDING MATERIALS OF AUSTRALIA.

ALSO

TABLES, NOTES, AND EXAMPLES OF ESTIMATING,

WITH RULES FOR MEASUREMENT.

BY

CHARLES MAYES,

ARCHITECT AND CIVIL ENGINEER.

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1886.

TO ARCHITECTS, BUILDING SURVEYORS, &c.

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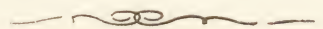

I beg to call attention to Neave and Co's. advertisement at the end of the Book, they have sent me the only complete list of Public and Domestic Sanitary Appliances, with the Sydney prices, I have seen. As this edition is now printed I regret I cannot give it the place and publicity it deserves. With the exception of the prices of Builders' Ironmongery, pages 144 to 150 by Lassetter and Co., and the approximate prices of Timber and Joinery in Melbourne by J. Wright and Co., I have had great difficulty in obtaining authentic information or prices.

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PRINTED BY PRESTON & FORD, AT THE "SUBURBAN INDEPENDENT" OFFICE, KING STREET.

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ORNAMENTAL GLASS.

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ERATA.

Page 55. Read, common bricks in Sydney from £2 4s. to £2 12s. per 1000.

Page 103. Read, Plaster, fine, 14s.; superfine, 16s.; Portland cement, 14s.; Marble cement, fine, 35s. per cask.

Page 118. Deduct 60 per cent. for Black Iron Pipes, and 40 per cent. for gal. Iron Pipes.

Page 139. Read, Cor. gal. iron, £18 to £20 per ton; 10ft. sheets 30s, and 9ft. sheets 20s. per ton extra. Plain gal. iron, £22 to £24 per ton.

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BROOKS, ROBINSON AND CO.

PREFACE

THE fourth Edition of this Work having sold out nearly a year ago, I began to revise this Edition in December last, expecting to publish it within six months, but the labour of doing so has been much greater than I expected. The alteration of the size to crown octavo with the enlarged and more complete Book and Index, are admitted improvements.

With the intention of still further improving the Work I have offered a Prize of £7 for the best and £3 for the second best Revisions, if of sufficient merit, with Honorable Mention of the author of the third best Revision. The names of the successful Competitors will be published with the next Edition. (See Advertisement back of title page).

I beg again to remind Estimators that the prices I have given for Materials cannot in every case be relied upon except for Rough Estimates, the larger items should always be checked by the actual *current* prices, which are continually fluctuating by the law of Supply and Demand. The prices given for labour are more reliable, Artizans' wages being reckoned at from 1s. 3d. to 1s. 6d. per hour and labourers at 1s. per hour. In most cases the information will be found to apply to all the Australian Colonies except stated otherwise.

In treating of the Building Materials of Australia, I have been careful to note the Geological formation from which the Freestones, Sandstones, &c., are obtained.—*e.g.* it will be found that the sandstones obtained from the Coal Measures of New South Wales are similar to those found in the Coal Measures of Queensland, not only in their natural features as represented by their bold and vertical precipices or escarpments with almost level beds commanding the attention of strangers from Sydney, but also in their density, texture, colours, and cost of working, as given under the head of Masonry and Stonecutting,

CHARLES MAYES,

41 St. Mary-street,
Camperdown,
near Sydney,

September 30th, 1886

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BREAKING STRAINS OF METALS.

In lbs., per square inch.

METALS,	Specific Gravity.	Cubic foot in lbs.	Tearing Weight. in lbs.	Crushing Weight in lbs.
Brass—cast	8·4	524	18,000	10,300
„ wire	8·5	530	49,000	
Copper—cast	8·7	543	19,000	11,700
„ wire	9·0	562	60,000	
Iron—cast	7·2	450	18,000	80,000
„ wrought	7·7	480	55,000	35,000
„ plates	..	...	50,000	38,000
„ „ double riveted seams	...	...	35,000	
„ „ single seams	...	...	28,000	
„ wire and wire rope	...	...	85,000	
Lead—cast	11·4	712	1,824	7,000
Steel—tempered ..	7·85	490	100,000	
„ hardened... ..	7·78	485	74,000	
Tin	7·30	456	4,750	15,000
Zinc	7·00	437	7,500	

Fibrous Plaster.—This is flexible non-cracking, non-falling plaster, with centre flowers, cornices, &c., if required. Anyone using it will not dread the unsightly and dangerous results, arising from the shrinkage of ceiling joists, or the oscillation of floors used for dancing. The value of that *Peace of mind* ordinary cracking plaster ceilings cannot give, to their sub-residents is incalculable.—See Advertisement at end of Book.

TABLE OF THE CIRCUMFERENCES AND AREAS OF CIRCLES,
for either inches, feet, yards links or chains

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum	Area.
			9	28.27	63.62	18	56 55	254.47
¼	0.785	.049	¼	29.06	67.20	¼	57.33	261.59
½	1.571	.196	½	29.84	70.88	½	58.12	268 80
¾	2.356	.442	¾	30 63	74.66	¾	58 91	276.12
1	3.142	.785	10	31.42	78.54	19	59.69	283.53
¼	3.927	1.227	¼	32.20	82.52	¼	60 47	291.04
½	4.712	1.767	½	32.99	86.59	½	61.26	298.65
¾	5.498	2.405	¾	33.77	90.76	¾	62 05	306.35
2	6.283	3.142	11	34.56	95.03	20	62.83	314.16
¼	7.069	3.976	¼	35.34	99.40	¼	63.62	322.06
½	7.854	4.909	½	36.13	103.87	½	64.40	330.06
¾	8.639	5.939	¾	36.91	108.43	¾	65.19	338.16
3	9.425	7.068	12	37.70	113.10	21	65.79	346.36
¼	10.210	8.296	¼	38.48	117.86	¼	66.76	354.66
½	10.995	9.621	½	39.27	122.72	½	67.54	363.05
¾	11.781	11.044	¾	40.05	127.68	¾	68,33	371.54
4	12.566	12.566	13	40.84	132.73	22	69.11	380.13
¼	13.351	14.186	¼	41 63	137.89	¼	69.90	388.82
½	14.137	15.904	½	42.41	143.14	½	70.69	397.61
¾	14.922	17.720	¾	43.20	148.49	¾	71.47	406.49
5	15.71	19 63	14	43.98	153.94	23	72.26	415.48
¼	16.49	21.65	¼	44.77	159 48	¼	73.04	424.56
½	17.28	23.76	½	45.55	165.13	½	73.83	433.73
¾	18.06	25.97	¾	46 34	170.87	¾	74.61	443.01
6	18.85	28.27	15	47.12	176.71	24	75 40	452 39
¼	19.63	30.68	¼	47.91	182.65	¼	76.18	461.86
½	20.42	33.18	½	48.69	188.69	½	76 97	471.44
¾	21.20	35.78	¾	49.48	194.83	¾	77.75	481.11
7	21.99	38.48	16	50.26	201.06	25	78.54	490.87
¼	22.78	41.28	¼	51.05	207.39	¼	79.32	500.74
½	23.56	44.18	½	51.84	213.82	½	80.11	510 71
¾	24.35	47.17	¾	52.62	220.35	¾	80.90	520.77
8	25.13	50.26	17	53.41	226.98	26	81.68	530.93
¼	25.92	53.46	¼	54.19	233.70	¼	82.47	541.19
½	26.70	56.74	½	54.98	240.53	½	83.25	551.55
¾	27.49	60.13	¾	55.76	247.45	¾	84.04	562.00

TABLE (*Continued,*) SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains,*

Dia.	Circum.	Area	Dia.	Circum.	Area.	Dia.	Circum.	Area.
27	84 82	572.56	36	113 10	1017.9	45	141.37	1590.4
¼	85.61	583.21	¼	113 88	1032.1	¼	142.16	1608.2
½	86.39	593.96	½	114 67	1046.4	½	142.94	1626 0
¾	87 18	604 81	¾	115.45	1060.7	¾	143.73	1643.9
28	87.96	615.75	37	116 24	1075.2	46	144.51	1661.9
¼	88 75	626 80	¼	117.02	1089.8	¼	145.03	1680.0
½	89 53	637.94	½	117.81	1104.5	½	146.08	1698.2
¾	90.32	649.18	¾	118.59	1119.2	¾	146.87	1716 5
29	91.11	660 52	38	119 38	1134.1	47	147.66	1734.9
¼	91.89	671.96	¼	120 17	1149.1	¼	148 44	1753 5
½	92.68	683.49	½	120.95	1164.1	½	149.23	1772.1
¾	93 46	695 13	¾	121.74	1179.3	¾	150.01	1790.8
30	94 25	706.86	39	122.52	1194.6	48	150.80	1809.6
¼	95.03	718 69	¼	123.31	1209.9	¼	151.58	1828.5
½	95.82	730.62	½	124 09	1225.4	½	152.37	1847.5
¾	96.60	742.64	¾	124.88	1241.0	¾	153.15	1868.6
31	97.39	754.77	40	125.66	1256 6	49	153 94	1885.7
¼	98.17	766.99	¼	126.45	1272.4	¼	154 72	1905.0
½	98 97	779 31	½	127.23	1288.2	½	155 51	1924.4
¾	99.75	791.73	¾	128.02	1304 2	¾	156 29	1943.9
32	100 53	804 25	41	128.81	1320 3	50	157.08	1963.5
¼	101.32	816.86	¼	129.59	1336 4	¼	157.87	1983.2
½	102 10	829.58	½	130.38	1352 6	½	158 65	2003 0
¾	102.89	842 39	¾	131.16	1369 0	¾	159 44	2022.8
33	103.67	855.30	42	131.95	1385.4	51	160.22	2042.8
¼	104.46	868.30	¼	132.73	1402 0	¼	161.01	2062 9
½	105.24	881.41	½	133.52	1418 6	½	161.79	2083 1
¾	106.03	894.61	¾	134 30	1435.4	¾	162.58	2103 4
34	106.81	907.92	43	135.09	1452.2	52	163.36	2123.7
¼	107.60	921.32	¼	135.87	1469.1	¼	164.15	2144.2
½	108.38	934.82	½	136.66	1486.2	½	164.93	2164.8
¾	109.17	948.41	¾	137.45	1503.3	¾	165.72	2185.4
35	109,96	962.11	44	138.23	1520.5	53	160.50	2206 2
¼	110.74	975.90	¼	139.02	1537 8	¼	167.29	2227.1
½	111.53	989.80	½	139.80	1555.3	½	168.08	2248.0
¾	112,31	1003.7	¾	140.59	1572.8	¾	168.86	2269 1

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains.*

Dia.	Circum.	Area	Dia.	Circum.	Area.	Dia.	Circum.	Area.
54	169.65	2290.2	63	197.92	3117.3	72	226.20	4071.5
¼	170.43	2311.5	¼	198.71	3142.0	¼	226.98	4099.8
½	171.22	2332.8	½	199.49	3166.9	½	227.77	4128.3
¾	172.00	2354.3	¾	200.28	3191.9	¾	228.55	4156.8
55	172.70	2375.8	64	201.06	3217.0	73	229.34	4185 4
¼	173.57	2397.5	¼	201.85	3242.2	¼	230.12	4214.1
½	174.36	2419.2	½	202.63	3267.5	½	230.91	4242.9
¾	175.14	2441.1	¾	208.42	3292.8	¾	231.69	4271.8
56	175.93	2463.0	65	204.20	3318.3	74	232.48	4300.9
¼	176.72	2485.1	¼	204 99	3343.9	¼	233.26	4330.0
½	177.50	2507.2	½	205.77	3369.6	½	234.05	4359.2
¾	178.29	2529.4	¾	206.56	3395.3	¾	234.83	4388.5
57	179.07	2551.8	66	207.35	3421.2	75	235.62	4417.9
¼	179.86	2574.2	¼	208.13	3447 2	¼	236.41	4447.4
½	180.64	2596.7	½	208.92	3473.2	½	237.19	4477.0
¾	181.43	2619.4	¾	209.70	3499.4	¾	237.98	4506 7
58	182.21	2642 1	67	210.49	3525.7	76	238.76	4536.5
¼	183.00	2664.9	¼	211.27	3552.0	¼	239.55	4566.4
½	183 78	2687.8	½	212.06	3578.5	½	240.33	4596.4
¾	184.57	2710.9	¾	212.84	3605.0	¾	241.12	4626.4
59	185.35	2734.0	68	213.63	3631 7	77	241.90	4656.6
¼	186.14	2757.2	¼	214.41	3658.4	¼	242.69	4686.9
½	186.93	2780.5	½	215.20	3685.3	½	243.47	4717.3
¾	187.71	2803,9	¾	215.99	3712 2	¾	244.26	4747.8
60	188.50	2827.4	69	216.77	3739.3	78	245.04	4778.4
¼	189.28	2851.1	¼	217.56	3766.4	¼	245 83	4809.1
½	189.07	2874 8	½	218.34	3793 7	½	246.62	4839 8
¾	190.85	2898.6	¾	219.13	3821.0	¾	247.40	4870.7
61	191.64	2922.5	70	219.91	3848.5	79	248.19	4901.7
¼	192 42	2946.5	¼	220.70	3876.0	¼	248.97	4932.8
½	193.21	2970 6	½	221.48	3903.6	½	249.76	4963 9
¾	193.99	2994.8	¾	222.27	3931.4	¾	250.54	4995.2
62	194 78	3019.1	71	223.05	3959.2	80	251 33	5026.6
¼	195 56	3043.5	¼	223.84	3987.1	¼	252.11	5058 1
½	196.35	3068.0	½	224.62	4015 2	½	252.90	5089 6
¾	197.14	3092.6	¾	225.41	4043.3	¾	253.67	5121.2

TABLE (*Continued*), SHOWING CIRCUMFERENCES AND AREAS OF CIRCLES, *for either inches, feet, yards, links, or chains.*

Dia.	Circum.	Area.	Dia.	Circum.	Area.	Dia.	Circum.	Area.
81	254.47	5153.0	87	273.32	5944.7	93	292.17	6792 9
½	256.04	5216.8	½	274.89	6013.2	½	293.74	6866.2
82	257.61	5281.0	88	276.46	6082.1	94	295.31	6939.8
½	259.18	5345.6	½	278.03	6151.4	½	296.88	7013.8
83	260.75	5410.6	89	279 60	6221.2	95	298.45	7088.2
½	262.32	5476.0	½	281.17	6291.3	½	300.02	7163 0
84	263.89	5541.8	90	282.74	6361.7	96	301.50	7238.2
½	265.47	5608.0	½	284.31	6432.6	½	303.16	7313 6
85	267 04	5674.5	91	285.89	6503.9	97	304.65	7389.8
½	268.61	5741.5	½	287.46	6573.6	98	307.84	7542.9
86	270.18	5808.8	92	289.03	6647.6	99	311.00	7697.7
½	271.75	5876.6	½	290.60	6720.1	100	314.16	7854.0

CIRCUMFERENCES.—If the diam. is between 100 and 200, call the radius the diam. and double the given circumference. If between 200 and 300, enter the Table with one-third the diam., and multiply the given circumference by 3. If betwe n 300 and 400, or 400 and 500, enter the Table with one-fourth or one-fifth, and multiply by 4 or 5, and so on for any number, taking care to multiply the given circumference by the same figure that you divided the diam. by.

EXAMPLE.—Required the circumference of a circle whose diam, is 152.—Enter the Table with the radius 76, the circumference given is 238.76 and 238.76, x 2 = 477.52, the circumference required.

AREAS.—If the diam. is more than 100, enter the Table with one-half or one-third, &c., as above, and multiply the area given by (4, or 9 &c.,) the *square* of the figure you divided the diam. by.

EXAMPLE.—Required the area of the circle given in the last example. Opposite to 76 the area given is 4536.5 and 4536.5 x 4 [2 x 2]= 18146.0, the area required.

CAPACITY.—The given or ascertained areas in inches, multiplied by 0.0443, or the areas in feet multiplied by 6 23, will give the number of gallons equal to the area, by one foot in depth.

EXAMPLE.—Required the contents per lineal foot of a 15 in pipe The area given is 176.71 and 176 71 x 0433 = 7.65 gallons. See p. 16. The contents per foot in depth of a tank 12 ft. diam. will be = 113.10 x 62.3 = 704.6 gallons

(From the LONDON BUILDER, March, 1873, &c.)

Crushing weight in lbs. per square inch.

	Ordinary. lbs.	Dry. lbs.
Red deal	5750	6580
White deal	6780	7290
Spruce pine	6500	6820
Mahogany	8200	8200
Quebec oak	4230	5980
English oak	6480	10,050
Pitch pine	6790	6790
Yellow pine	5370	5440
Red pine	5400	7510
Willow	2900	6220

The above are picked specimens, without knots or flaws. The highest compression relied upon for pine, is 900, or not more than one-eighth the above tabulated strength.

MORTAR.

	lbs.
Lime and river sand ...	436
Lime and pit sand	578
Cement and pounded tiles	670

These mortars were 18 months old; they were again tried after 15 years, when the lime mortars had increased one-eighth in strength.

N.B.—The ascertained pressure borne by stone and brickwork in noted buildings, like the actual pressure trusted to in the use of timber, is about one-eighth of the tabulated strength.

MORTAR.

Tensile strength by Vicat.

	Per sq. in. lbs.
Sharp sand and best hydraulic lime	136
Do. and common lime ...	51

GRANITE.

	Per sq. in. lbs.
Aberdeen blue	10,900
Peterhead	8,260
Cornish	6,350
Kingstown (Irish) ...	10,110
Newry „	13,440

BUILDING STONES.

Arbroath paving	7,880
Caithness	6,490
Dundee sandstone... ...	6,630
Craigleith white freestone	5,480
Bramley fall, near Leeds	6,050
Derby grit (sandstone)	04,00
Yorkshire paving	5,710
Compact limestone ...	7,710
Anglesea, ditto	7,580
Valencia slate	10,940
Basalt, Irish test	11,970

BRICKS.

	Per sq. in. lbs.
Pale red	560
Red brick	800
Yellow face paviors ...	1,200
Stourbridge firebrick ...	1,710
North Wales, ditto ...	2,130
Brickwork in cement, Molesworth	1,000
Portland cement, Molesworth	1,000

CRUSHING WEIGHT.	Per sq. in tons.
Cast-iron, mean crushing weight	38
Wrought iron	18
Ditto, compressive set begins about	12
Wrought iron, rolled bars	25
Do. angle iron and straps	24
Wrought plates, lengthwise	22½
Wrought plates, crosswise	20½

TIMBER.—Tensile strength.

	Per sq. in lbs.
Christiana deal ...	12,900
Elm	14,400
Mahogany ...	8,000
Oak, English ...	10,000
Pitch pine ...	7,600
Teak	15,000
Lancewood (Rankine) ..	23,400
Beech (Molesworth) ...	20,000
Cedar, W. Indian, do. ...	5,000
Red deal, Baltic ...	11,400

AUSTRALIAN TIMBER.
Tensile strength, by
F. A. Campbell, C.E.

	Per sq. in. lbs.
Blue gum, Tasmania ...	26,700
White gum, Victoria ...	27,800
Blackwood, Tasmania ...	25,000
Ironbark, N. S. W. ...	26,500
Stringy bark, Victoria ...	23,600
Red, or flooded gum ...	17,800
Kauri pine, N. Zealand...	10,700
Cedar, Queensland ...	3,000

PORTLAND CEMENT,

Tensile strength.

	Per sq. in. lbs.
Neat cement, 3 tests ...	470
1 of cement to 1 of sand, 3 tests	329
1 of cement to 2 of sand, 3 tests	193
1 of cement to 3 of sand, 3 tests	140

The above are the *average* tests with 3 degrees of fineness, the finest cement being the best in each case. H. Reid's Work, on Portland cement, p. 325.

———

N.B.—It will be seen on reference to the articles on Portland cement, pages 15, 96, that the cements tested in Melbourne and Sydney are superior to the above.

To Measure Pipes, Tanks, &c.

The following is a rough and ready way to find the contents of circular tanks, wells, and pipes:—Square the diameter in inches, and cut off the right-hand figure as a decimal, and the result will be gallons in each 3 feet (1 yard) of depth, or length if a pipe —

Diameter. Inches.	Pipes. Inches.		Square.		Gallons. in 3 feet.
2	2 x 2	=	4	or	0·4
6	6 x 6	=	36	or	3·6
12	12 x 12	=	144	or	14·4

WELL OR TANK.

36	36 x 36	=	1,296	or	129·6
100	100 x 100	=	10,000	or	1,000·0

To find amount of Interest by Practice.

In calculating interest, the following table will be found valuable :

1¼	per cent.	is	1-80th	of 100	10	per cent. is	1-10th	of 100
2	,,	,,	1-50th	,,	15	,, ,,	3-20ths	,,
2½	,,	,,	1-40th	,,	20	,, ,,	1-5th	,,
4	,,	,,	1-25th	,,	25	,, ,,	1-4th	,,
5	,,	,,	1-20th	,,	33⅓	,, ,,	1-3rd	,,

To find the Value of Decimals.

To find the value of the decimal parts of 1 ton :— Multiply the decimal parts by 20, to reduce them to cwts. ; and point off in the product as many decimal places as are found in the decimals required to be worked out ; the result will be the answer in cwts. Then multiply that product by 4, to reduce it to qrs. ; and proceeding as before multiply by 28 to reduce it to lbs., or again by 16, to bring it to ounces.

OUNCES = DECIMALS OF A POUND.

oz.	lbs.	oz.	lbs.	oz.	lbs.	oz.	lbs.
1	·06	5	·31	9	·56	13	·81
1½	·09	5½	·34	9½	·59	13½	·84
2	·12	6	·37	10	·62	14	·87
2½	·15	6½	·40	10½	.65	14½	·90
3	·19	7	·43	11	·69	15	·94
3½	·22	7½	·46	11½	·72	15½	·97
4	·25	8	·50	12	·75	16	1·00
4½	·28	8½	·53	12½	·78		

CEMENT.

The following particulars were obtained after the article on Portland cement page 95 was printed.

Siebel and Mathew's Crown Brand. Portland Cement, Petsch Doehling and Co , Agents, 332 Kent Street, Sydney. This Cement was tested by the Harbours and Rivers Department, Sydney, in April 1886, with the following result. The tensile strength of the neat cement mixed with 19½ per cent. of water then placed in water 24 hours after mixing, and allowed to soak for six days, when it was taken out. tested and broken with a tensile strain by Adie's testing machine of 585 lbs. per square inch, the standard minimum test by recognised authorities being 400 lbs. per square inch. Other comparative tests were equally favorable.

Faucus Cement sold by the same Agents is reported to set in 2 hours and to have broken with a tensile strain of 410 lbs. per square inch 7 days after mixing, and 545 lbs. per square inch, 28 days after mixing, the briquette or bar remaining the first day only in the air and the remainder under water.

Levett's "Castle" Brand English Portland Cement. MacDonnell and Busch, Agents, Sydney This cement was tested by the Harbors and Rivers Department, Sydney, in April, 1886.

The neat cement was placed in water 24 hours after mixing where it remained for six days, when it was taken out and broken with a tensile strain by Adie's testing machine of 609lbs per square inch. The other usual tests being equally favorable.

TRAEGERWELLBLECH means a weight-bearing, deep, corrugated iron plate, the corrugations being formed while the sheet is cold, and as they are generally deeper than their width, the iron for ordinary sizes must be of the best quality, since cold inferior iron will not bend sharply without fracture.

Galvanized Corrugated iron has been long used as an arch for segmental roofs, the sides or springing being secured by iron tie rods. About 20 years ago I designed and carried out a roof 26 feet span by 5 feet rise, to cover four houses on the Rushcutter Bay road, Sydney. The sides were secured to bevelled pine wall plates, which were connected by the lining-boards forming the ceiling. The roof was without rafters, ceiling joists, or special ties.

Strength.—The strength of common corrugated iron for girders or floors is shown by Trautwine in his "Engineers' Pocket-book," page 371. The great superiority of the TRAEGERWELLBLECH is the increased depth and less width of the corrugations. The common corrugated iron has a depth of about three-quarters of an inch by a width of about 3¾ inches, or one-fifth the height, whereas the depth of the patent TRAEGERWELLBLECH is at least equal to its width, giving about five times the strength. A still greater increase of strength (generally eight times) is obtained by curving the sheets for flat arches between girders for fireproof floors, &c. It is a cheap and effective substitute for brick or concrete arches, generally used for fireproof floors or roofs.

Partitions.—Traegerwellblech is also well adapted for partitions, where the conveyance of sound is not detrimental.

Roofs of parabolic section have been constructed of Traegerwellblech, 60 feet span.

Tests.—A curved Traegerwellblech plate 11 feet span and 14 inches rise was loaded with pig iron, and broke at a rate of 2800lbs. equally distributed per super foot. The weights required to be supported by different kinds of floors is shown in page 205 of this book.

After the most severe tests, this corrugated iron was adopted for the ceilings of the Freehold Investment and Banking Company, at Melbourne, where it has been used in at least twelve public and private buildings. See advertisement at back of this book.

Amended Tariff in New South Wales.

The tariff, as shown on page 155, has been altered by the Legislative Assembly for approval by the Legislative Council. The articles chiefly affected are—Doors and sashes, 2s each; timber, dressed 3s. undressed 1s 6d, per 100 superficial feet; paints and colours, ground in oil, per ton, 60s; lead, sheet, roll, or pipe, per ton, 40s; bolts, spikes, nuts, rivets, screws, and washers, plain or galvanised, per cwt., 2s. *Free list iron*, bar, rod, plate, sheet, bundle, hoop and pig, old iron and scrap; *lead*, pig; *stones*. building, flag, grind, curbing and guttering, mill, and paving-stones; *yellow metal*, sheets and nails; *zinc*, plain sheet.

Per foot in depth.

	s.	d.
Boring in ordinary soils, including use of tools and tackle, but not pipes, down to 20 feet ..	2	3
Ditto, for every foot from the top down to 40 feet	3	4
Ditto, do. do. 60 feet	4	9
Ditto, do. do. 80 feet	7	6
Ditto, do. do. 100 feet	10	6
Ditto, do. do. 200 feet	21	0

Add 25 per cent. to the above, if through hard gravel or soft rock.

Ditto 50 per cent. if through compact sandstone or hard shale.

Reckon twice the amount if through basalt or bluestone, or quartz boulders.

The above prices down to 200 feet are for a bore-hole not exceeding 4 inches, to be made truly vertical by using boring rods 1 inch square, so that pipes may be inserted if required. If pipes are used they should be of wrought iron, except for very deep holes, when cast iron pipes are required, being thicker and more easily driven.

For weight and cost of wrought and cast iron pipes, *see* Index.

Diamond Drills.—From a Return laid before the Victorian Parliament, April 10, 1881, it appears that the contract prices for the drills then being made in the colony were—

For 2 underground diamond drills, each	£253
,, 2 air compressers (Ford's) to work them ..	507
,, 3 surface diamond drills, each..	370
,, 3 boilers to work them, each	307

These prices are exclusive of costs of rods, bore barrels, bits, &c., Ninety-eight bits set in the colony have bored an average of 23½ feet each.

Boring per foot in depth.

	s.	d.
Through diorite or trachyte, the hardest rocks on the goldfields	12	0
Basalt and underlying drift	8	6
Sandstone and shale (on goldfields)	7	6

Mem. for comparison.—In drilling shallow, 1½ inch holes through greenstone or serpentine, one man sunk 1 foot per hour blunting 6 drills in that time.

Sinking shaft, 6 x 3, through trachyte (or the hardest rock at Hill End goldfields), three men averaged one foot per day for 120 feet deep, this, at 8s per day is 24s. per foot in depth, exclusively of sharps, windlass and powder or dynamite.

From the N. S. Wales Mining Report for 1884 I abstract the following particulars of 3 bore holes sunk at the Gladesville Asylum, near Sydney, (in the Coal Measures) with the Government Diamond Drills in 1883 :—

	No. 1. Bore	No. 2. Bore	No. 3. Bore.
Total number of days occupied ...	93	34	36
Total cost per foot in depth ...	7s. 4¾d	6s. 1½d.	4s. 2¾d.
Number of feet bored	442⅛	197⅞	365¼

The time actually occupied in drilling the holes was less than half the total number of days occupied as above stated.

The Diamond Drill will bore through 6 feet of granite, 10 feet of bluestone, 14 feet of white marble, 20 feet of Sydney freestone (sandstone of coal measures) in one hour.

Norton's Tube Wells are portable, light, simple, cheap and effective ; they were used by the British Army in their advance through Abyssinia, and have since come into almost general use, where water is required for camping or household purposes, or for trial holes where a larger supply is required. The apparatus includes 28 feet of 1½ inch gal. iron pipes and costs in Sydney only £10. A similar apparatus for a 2-inch pipe costs £13 10s. complete. The pipe is supported by a wrought iron tripod stand, and driven by an iron monkey, viz., tripod stand with monkey, &c., £6 ; Douglas pump, £1 10s ; Gal. iron, 2-inch pipe, £2 ; brass-covered perforated point, &c., £4=£13 10s.

In Christchurch, New Zealand, about two-thirds of the houses have 1½-in. malleable iron pipes (Norton's well tubes), driven down about 80 feet, from which a plentiful supply of water is obtained ; there were 1,600 of them in 1878.

Australian Water Auger.—The importance of obtaining water on some of the back runs has been valued at £20,000, and as many successful borings have been made, including one of 573 feet, 35 miles from the Darling, it confirms the idea endorsed by the Report of Mr. Wilkinson, the Government Geologist of New South Wales, that artesian wells may be successfully sunk over a large portion of the Darling country. To effect this desirable object, Wright and Edwards' Water Auger may be especially recommended. It is simple and easily worked and costs about £150, with the piping, tools, and appliances necessary to sink 200 feet. The whole cost is estimated at £290, or 29s. per foot. The rate of progress is from 2½ to 3½ feet per hour. The apparatus is so complete that brackish water has been passed through and excluded from the pipes in favour of pure fresh water attained at greater depths. It is equally effective in seeking for gold or coal boring generally.

The Tiffen Borer.

In Australia, where the high price of manual labour is the most serious obstacle to the development of its vast resources ; the successful application of horse-power is a public boon. The Tiffen Borer can be successfully worked for all depths, up to 1000 feet, with one horse, one man and a boy, for wages and horse-feed, at a cost of about

17s. per day, or one-third the cost of manual labour. The work done with the 8-inch earth auger averages about 25 feet per day, equal to about 8d. per foot, hard sandstone, 1s. 9d., extra hard, or the hardest rocks, from 8s. to 16s. per foot, besides incidental expenses. When water is obtained, a supply from an 8-inch hole would be equal to the supply from a well 8 feet in diameter. This is one of the natural advantages of *boring*, as compared with well-sinking. After the water supply is obtained, it may be continued at a nominal outlay by using Althouse's or other approved wind-pump, which would raise the water into a reservoir, with waste weir, without supervision, wages, or horse feed. For irrigation, sheep or cattle, where the supply is not required to be continuous, and the reservoir is large enough to wait for the wind, these combined means for obtaining a water supply cannot be too strongly recommended. The borer is equally applicable in searching for minerals.

Cost of Machines, &c.

No. 1. Plant with two 8-inch earth augers, horse gear, &c., complete for a depth of 115 feet £110
„ 2. Ditto for a depth of 210 feet 130
„ 3. do. 306 „ 150
„ 4. do. 400 „ 170

If rock is met with, the necessary *drilling attachments* cost from 44 to 50 per cent. extra.

M'Lean Bros. and Rigg, of Melbourne and Sydney, are the sole agents.

DREDGING PER TON.

Dredging and Depositing by Government Dredges, from Harbors and Rivers Report, Sydney, April, 1881.

	s.	d.
Sydney Circular Quay, part rocky bottom, 9d. to	1	3
Ditto without rock	0	10½
Newcastle, sand on rocky bottom	0	8
Ditto, part rock, broken up	1	0
Hunter River, ballast and soft rock	0	9
Clarence River, sand only	0	8¼
Macleay River, ditto	0	9¾
Shoalhaven, sand deposited at easy distance ..	0	5¼
Myall River, including repairs	2	9¼

Per Cubic Yard.

During 1881, about 492,000 cu. yds. of clay and silt were removed from the bed of the Yarra and Hobson's Bay for reclamation purposes at a cost of	0	9½

S. M'Caughey's patent prize 4-wheel Automatic Earth Scoop, for making dams, roads, drains, railways, &c., is worthy of trial. Under favourable circumstances the cost per cubic yard would not be more than one-third the cost of hand work. Where the ground is too hard for the scoop it might be loosened with a plough at one-tenth the cost of manual labour, as shown on page 17, and then scooped up and removed by this labour-saving earth scoop; the price is £47 cash, and it requires only one man and two horses to remove from 100 to 200 cubic yards of earth, loam, silt, sand or mud per day. When the ground is loosened with a plough from 4 to 6 inches deep the driver can raise the scoop with 7 cwt. of clay, &c., by a pressure of about 30 lbs. The various portions of the machine are sold in duplicate and are easily replaced. David Munro and & Co., of Melbourne, are the Agents for the colonies, and Martin and Co., the Sydney Agents.

EXCAVATOR'S WORK.

Per cubic yard, including plant, powder &c.

Wages, 1s. per hour.

	s.	d.
1. Sand or loose soil, shovel work, getting and casting	0	6
2. Hard ditto or loam pick and shovel work, ditto	0	9
3. Wet mud, sand, or silt, ditto, getting and casting	0	10
4. Getting and casting, or filling into drays not more than six feet deep, *pick and shovel work*	1	0
5. Ditto, from 6 to 12 feet deep, ditto	1	4
6. Ditto, from 12 to 18 feet deep, ditto	1	8
If in stiff clay or hard gravel, add to items 4 and 5	0	3
If in soft rock or loose boulders, add do.. ..	0	6
If in hard sandstone or shale, add do	1	3
If in compact bluestone or trap, add do.. ..	2	6
If in compact granite, gneiss, or sienite, add do	4	0
If wheeled one *run* of 20 yards, add	0	3
Ditto for every additional *run*, add	0	3

N.B.—If the excavation is from the face of an open cutting, the cost will be the same as if not more than 6 feet deep as per 4th item. This work is facilitated by partly undermining and then wedging down with iron bars or *feathers*.

Items 5 and 6 are only used when the earth is raised to the surface in lifts as in cellars or basements, gasholders, &c. If these holes are large enough, the best way is to cart the stuff by a spiral road, gradually descending towards the bottom, and then raise the earth, &c., forming the temporary road, by lifts or barrows with planks,

In excavating for covered Reservoirs on hills, the gullets or tunnels required for the inlet and outlet pipes may be used as inclines for the removal of the earth shale, &c., from the side of Reservoir, and afterwards for carting the materials, &c., required for the lining into the Reservoir.

The prices for excavation include the use of plant on a small scale, but if expensive plant has to be bought for one contract only, it would not pay at these prices :—

	s.	d.
Getting out trenches for foundations of walls for buildings, levelling and stepping; bottom part refilled and rammed, and the remainder spread as required	2	6
Ramming ground in layers around walls in embankments, add to above prices	0	6
Forming open tanks or waterholes for sheep or cattle, up to 12 feet deep in clay	1	3

Reservoir dams from "Molesworth."—Width at top in low dams should be equal to the height. Breast or inside slopes 3 to 1 : back slopes 2 to 1.

Height above surface of water not less than 3½ feet.

Getting and raising coal (thick seams) per ton from 4s 6d to	6	0

PER ONE HORSE LOAD.

Horse, dray, and driver 1s. 6d. per hour.

	s.	d.
Carting, tipping and levelling *lead* not more than quarter mile	0	8
Ditto from quarter to half mile *lead*	1	0
Add for every extra half mile ditto	0	8

Ordinary single horse drays contain about 18 bushels or 23 cubic feet.

Rock or shale increase in bulk from the solid about double : therefore, to obtain the price per cubic yard in cutting, reckon about 2¼ times the above prices.

For hard clay, loam, gravel, conglomerate, and similar dense materials, reckon about 1¾ times the above prices.

If Dobbin carts of similar size are used there will be a saving in the loading because of the less height the stuff has to be lifted

If the leads are short, say less than 4 chains, barrowing with planks will be still cheaper, the height of the barrows being even lower than the dobbin carts.

Loosening ground 7 ins. deep with a plough, at 20s. per acre, costs per cubic yard only one farthing, under most favourable circumstances ; but if the ground is hard it will cost double or treble this amount for ploughing.

Per superficial yard, including tools, &c.

Wages, 1s. per hour.

	s.	d.
Levelling made earth not more than one foot deep	0	2
Surface forming for roads not more than 9 inches deep, in earth, hard clay, &c. ... 0 3 to	0	4
Ditto do. in rock ... ... 0 9 to	1	0
Soiling slopes of embankments and cuttings 0 4 to	0	6
Removing and relaying grass turf ... 1 0 to	1	3

Ploughing up surface of ground at 20s. per acre is equal to 1½d. per rod or .05d. per sup. yard; at 40s. per acre equal to 3d. per rod or ½d. per cubic yard.

CUTTINGS AND EMBANKMENTS.—In equalising the contents of cuttings and embankments for roads, railways, &c., it is not usual to make any allowance for the increased bulk of loose material, except in increasing the height of the embankments for settlement, the extent of which will depend upon the material, rock settling down the least and wet clay the most; it is always considered favourable to the contractor to pay him for embankments, if he has taken the work by the cubic yard.

Proportion of getters, fillers, and wheelers, for run of 40 yds.

	Getters.	Fillers.	Wheelers.
In loam, earth, sand gravel, clay, &c...	1	1	1
Hard earth or gravel, marl, &c.... ...	1	2	2
Hard clay, loose shale, &c.	1	1¼	1¼
Rock, if blasted, or broken up from ...	3	1	1

MEASUREMENT OF EARTHWORK.

In the measurement of cuttings and embankments with slopes, the common system of average heights gives less, and the common system of average areas gives more than the true contents; the proper system is by the *prismoidal formula*, from which the annexed Table for the measurement of earthwork is calculated, but even in this case the cross section is presumed to be perfectly level, the slopes to be quite true, and the change from chain to chain regular and gradual, otherwise the measurement is incorrect.

To show the necessity of correctly ascertaining the cubical contents of earth-work where the contractor tenders for a *lump* sum, I have taken the following from M'Neil's Earthwork Tables, which are calculated from the *prismoidal formula*:—

"In calculating the contents of embankments and cuttings in a section, the true content of which is 332,390 cu. yds., by the common methods of mean heights is only 310,652 cu. yds., thus making 21,738 cu. yds. less than the true content; by the common method of mean areas the error in excess will be 43,487 cu. yds."

PRISMOIDAL FORMULA.— Average area equal to 4 times the middle area added to the sum of the end areas and divided by 6. In using the following constants instead of dividing the sum of the areas by 6, multiply them by the following constants for the length required in chains.

Sum of areas in feet multiplied by	0·2037	—cu. yds. in	½ chain.
Ditto	0·4074	„ cu. yds. in	1 chain.
Ditto	0·6111	„ do in	1½ do.
Ditto	0·8148	„ do. in	2 chains.
Ditto	1·2222	„ do. in	3 do.
Ditto	1·6296	„ do. in	4 do.
Ditto	2·0370	„ do. in	5 do.
Ditto	2·4444	„ do. in	6 do.

The ends of cuttings on sidelong ground always form a pyramid for which multiply the area of the base by one-third the length.

In light or shallow cuttings and embankments for railways, roads or tramways, the common average area will be sufficiently near for tendering, as it gives an excess in measurement in proportion to the inequalities of the heights. If the heights are given at every chain, "Bidder's Tables" will give the readiest and most correct measurements to the nearest foot in height, if the cross section of ground is tolerably level.

SINKING TANKS, WELLS OR SHAFTS.

Per cubic yard, including tools, tackle and powder.

Wages of well-digger, 1s. per hour.

	s.	d.		s.	d.
Excavation for wells or small tanks or shafts, not more than 20 feet deep, light ground				2	3
Ditto in stiff clay or hard gravel				3	6
Ditto in sandstone, hard rock, or shale	9	0	to	13	6
Ditto in bluestone or other trap rock	18	0	to	27	0
From 20 to 40 feet deep, add one-third.					
From 40 to 70 feet deep, add two-thirds.					
From 70 to 100 feet deep, reckon double					
Guttering in sandstone per sup. foot ...	1	0	to	1	3
Ditto in blue stone or granite, do., ...	1	6	to	3	0

N.B.—In the third and fourth items take the least price for the largest, and the greatest for the smallest wells, on account of the difficulty of working and blasting rock in confined areas.

If blasted with gunpowder or dynamite, one side of the tank or well must be kept above the other to give a face and render the blasts effective. See quarrying.

GUTTERING.—In rock excavation, where any portion of sides are required to be left even or picked, a groove or gutter must be kept in advance of the main excavation to prevent injury to sides by blasting.

In quarrying it is always considered advisable to obtain a vertical face to the quarry, the higher the better; if the stone is detached at the ends with a natural cleavage, parallel with the face of the quarry, you will then be able to obtain an immense quantity of stone with a single hole. In August, 1880, a block of freestone was detached from the face of a quarry at Pyrmont, about 150 feet long by 35 feet wide and 46 feet deep. A 5-inch hole was bored in the line of cleavage, about 75 feet from each end of the quarry, and 35 feet from its face, to the bed of the quarry 46 feet in depth, into which was inserted 200 lbs of blasting powder, filling up the lower 26 feet of the hole, the upper 20 feet tamped with dry clay. It was fired by electricity, the mass weighing about 15,000 tons being moved forward about 18 inches, ready to be wedged and split up into blocks suitable for building. This hole was fired in three places by electricity, removing 75 tons of freestone for every lb. of powder exploded. By Sir F. Burgoyne's formulæ for limestone—

this would have required $35^3 = \frac{42875}{32} = 1340$ lbs., the quantity actually used was nearer $35^2 = \frac{1225}{6} = 204$ lbs.

TAMPING or filling up the holes to prevent the powder blowing out, is an important item in blasting rock. It has been found, after long experience, that dry clay is the best material, and broken bricks, moistened, the second best; the depth of the tamping should also be at least equal to the depth of powder, although I have known effective blasts with only one-third tamping. Dynamite, which strikes downwards more than common powder, is said not to require so much tamping—water only being used in many cases—but it will be found that dry clay is best in all cases.

In opening a quarry there is always a loss of labour in removing surface soil from the top, or at the foot of the quarry, down to the natural bed, sometimes both; also in getting a vertical face and open ends for a really effective or great blast, so that an ordinary quarry does not pay for the first two or three months.

TANKS.—Unless there is a face or side obtained in sinking tanks or shafts in rocks, the powder or dynamite will have little effect; it is therefore usual to keep one side of the tank or hole at least 2 feet above the other, where practicable. This remark also applies to drives or tunnels. Where tanks or shafts are not lined it is usual to gutter or pick a smooth-faced channel over the whole surface of the sides; but as this process is very expensive, it is not adopted where it can be avoided.

Probably the largest and best finished rock tanks in Australia are those of the Callen Park Asylum, near Sydney, the sides being smoothly *guttered* by light, long-handled picks.

In quarrying for marble or granite, their respective hardness, shown by the time required in boring, may be ascertained under the head of Boring with the Diamond-drill in page 18.

Ford's Rock Drill, which is well adapted for boring holes for blasting; at the Sydney Exhibition on 24th January, 1880, bored one foot of bluestone in three minutes with a one-inch *square-edged* chisel.

Schram's Rock Boring Machines are well known: the cost of Drill and mountings complete, vary from £110 to £140 imported from Duncan Bros, London, E.C.

ROCK BLASTING for quarrying purposes is the most advantageous when practised on the largest scale, either by one or more holes fired simultaneously. An immense shot was fired at Pyrmont, near Sydney, about the year 1880, when 300 lbs. of blasting powder in a 5-inch hole, dislodged at least 30,000 tons of freestone, being at the rate of 100 tons per lb. of powder; as only one hole was used, it might have been fired by the common fuse, instead of by electricity, which was used, the powder being fired in three places giving a more sudden discharge. As dynamite is objected to for quarrying building stone, because of its too sudden action, it is doubtful whether firing a column of gunpowder in three places simultaneously is advantageous.

Blasting.—One lb. of the best blasting powder will remove from three to six perches of sandstone, or from three to six tons of bluestone, granite, &c., if used in the usual way; the powder is most effective if the line of resistance (the distance from the hole to the face of the rock) does not exceed one-half the depth of the hole, the ends being open or free.

Blasting Powder required for different sized Holes, &c.

Diam. of Hole Inches.	Powder in one foot Lbs.	Depth for 1 lb. of powder Feet dec.	Cost of Drilling, &c. Sandstone.	Bluestone.
			s. d.	s. d.
1½	0·71	1·41	0 8	1 4
2	1·26	0·80	0 10	1 8
2½	1·29	0·51	1 0	2 0
3	2·83	0·35	1 3	2 6
3½	3·85	0·26	1 6	3 0
4	5·03	0.20	1 9	3 6
4½	6·36	0·16	2 1	4 0
5	7·86	0·13	3 0	5 6
6	11·31	0·09	4 6	8 0

The last column includes labour, sharpening jumper, and fuse in charging and tamping at per foot for the first 6 feet; for the next 10 feet add one-half per foot, and from 16 to 26 feet double. For the first 6 feet, one man can manage the drill: from 6 to 16 feet two men, and from 16 to 26 feet, three men are required. If only one size of drill is used—say four inches in diam., it will wear away to 3½ inches before it is down 20 feet, even in the soft freestone of the coal measures, as at Sydney and suburbs.

Blasting by Electricity.

Until lately this was generally done by galvanic batteries with delfware jars or cells in which copper and zinc were acted upon by acids, &c.; thus in removing the Dover chalk cliff on January 26,

1843, 8 tons of blasting gunpowder removed 240,000 cu. yds. of chalk equal to 26 tons for each lb. of powder used. In the second great blast at the same place, on 1st May, 1843, 14 tons of chalk were removed for each lb. of powder exploded. The apparatus used was Daniells' Cell Batteries.

Latterly electro-magnetics have been used with great advantage. Probably the best apparatus or machine in the colonies for quarrying purposes is—

Bruguet's Magnetic Exploder.—This machine is contained in a small mahogany box, weighing about 20 lbs., and sold for about £12, or it may be hired ; it is said to be equal to firing 8 holes simultaneously. I have tried it with two 4-inch holes, containing 66 and 34 lbs. of blasting powder, and found it most simple and effective when used with 80 yards of No. 16 copper wire, insulated with gutta percha, removing about 900 tons of Sydney freestone. I have also fired, with the same machine, four of Able's Exploders simultaneously, the two side-wires being 30 yards each, and the three wires joining the four exploders about 11 yards each.

DYNAMITE.

As a substitute for blasting powder in quarrying, tunnelling, shaft or well sinking, clearing trees (either on land or under water), &c., dynamite has the following advantages :—

1. Its cost, compared to the amount of work got through, is about half that of gunpowder.
2. It can be used in wet workings with better results than any other explosive.
3. It is much safer than gunpowder, either in carriage, storage, or actual use, since it will not explode with a spark, or even the application of ordinary fire, but merely burns slowly away, and cannot be made to explode by being dropped from a great height on to rocks. These facts relating to its safety are fully borne out by official evidence given before the House of Commons "Select Committee on Explosive Substances" in 1874. Full instructions as to the best way of using it are given by the Patentee's agents in Melbourne and Sydney. Although more than 4000 tons are now annually used for blasting, there have been no accidents in transit or storage. Its cheapness, compared to gunpowder, was proved by the contractors for the railway tunnel under Clifton Downs, England, with the following *results in the same time*, the bore-holes being of the same size and depth :—

Gunpowder.—Distance driven, 8 lineal yards with 31 shots or bore-holes per yard forward.

Dynamite.—Distance driven, 15 lineal yards, with only 17 bore-holes or shots per yard forward.

The relative cost for 15 lineal yards was £29 10s. 7d. for gunpowder, and £16 10s. for dynamite, besides the great saving in labour and time on account of 210 fewer bore-holes being required for the 15 lineal yards, with a corresponding saving in fuse.

Dynamite is a compound of 75 per cent. of nitro-glycerine, with 25 per cent. of porous earth, and is in the form of paste or putty. It is fired with a heat of 420 deg. Fahrenheit, and if frozen should not be thawed by stoves, but by being put into a can, which is then placed in a vessel of hot water.

Snagging Rivers by blasting with dynamite, as practised in the Waikato River, New Zealand. The inspection was made by an hydraulic telescope (a gal. iron tube, with glass fixed at end.) The holes were bored with 1½-inch steel auger to 3½ feet below summer level. The charge of dynamite varies from 3 to 24 oz., ¼ lb. being used for a stump, 2 feet in diam. at about one-third the cost of sawing. A snag or log 4 ft. diam. requires 4½ lbs. of dynamite. The stumps are blown off at bottom of bore hole, as if sawn.—"Australian Building News," Jan., 1880.

Dynamite has been tried by quarrymen near Sydney, and objected to when the object is to obtain large sound square-sided blocks of sandstone for cutting or splitting up into ashlar, base-course, steps, sills, or cubed stones of any size, because its destructive effects are so great and sudden that it shatters the blocks too much, causing flaws and fractures where not required. The nitrous and sulphurous fumes are also said to penetrate the stone and greatly injure its lasting qualities.

The rock excavations, either in cuttings, headings, tunnels, shafts, wells or tanks, where the rock to be removed is not required for squared masonry, dynamite has been proved to be far superior to gunpowder. Major Moran, R.E., states in his report on experiments made by order of the British Government in India in 1860, that "whereas only 56 per cent. of the rock operated on was loosened by gunpowder, no less than 78 per cent. was shattered by dynamite; and again, while only 20 per cent. was removable by hand with powder, 62 per cent. was so, when broken up by dynamite. Rocks which might easily stop wheeled artillery for days, where blasting with powder would have to be resorted to, could with dynamite be got rid of in an hour or two with expert operators.

Dynamite is exploded in cartridges by copper detonators, the two should carefully be kept far apart until an explosion is required. The cartridges vary from ¾ in. to 1¼ in. diameter, by 3 to 4 inches long. They are rolled up in parchment paper, which is nitro-glycerine proof, but not waterproof. Five pounds weight of cartridges are then put into a card-board box, wrapped in oilskin paper, which is waterproof, but not nitro-glycerine proof.

Instructions for charging bore-hole.—Gently push or squeeze the cartridges with a *wooden rod or squeezer* into their places, then gently lower or push the detonator with the fuse attached into the dynamite, leaving at least a quarter of an inch of the cap outside the dynamite.

Be sure to fix the percussion cap or detonator tight on to the fuse with your nippers, or it will drop from the fuse into the hole, and will then be very awkward to recover.

Dynamite and *gun cotton*, when fresh, are from two to three times, and nitro-glycerine about four times as strong as blasting powder. Dynamite, price 2s. per lb. wholesale, in 50 lb. packages, and detonators, 35s. per 1000.

LITHOFRACTEUR is said to be as powerful as dynamite, but less sudden in its action, and is therefore in this respect more like blasting powder. *It is used in a similar manner to dynamite.*

Noxious gases.—Any ill effect from this cause is said to be caused by neglecting the following rules :—

1. See that the charge is soft and plastic before using.
2. Insert three fourths of the cap into the Lithofracteur (or pinner) and see that the fuse is firm in the cap or detonator.
3. Handle the cartridges as little as possible, and keep them away from the person or victuals.
4. Do not overcharge the holes, it increases the fumes only.
5. Never fire with powder as part of the blast.

TUNNELLING.

Per lineal foot (all found).

	£	s.
Drive 6 x 3 in hard, compact rock slate	1	10
Ditto in soft clay, rock or shale	0	16

RAILWAY TUNNEL.—If the rock is self-supporting, after reckoning the cost of guttering both sides and top, the *core* may be removed at about double the cost of similar rock in open cutting, but when timbering is required for subsequent lining, the cost is uncertain.

Per cubic yard.

	Without guttering. s.	d.	With guttering s.	d.
Tunnel 20 x 15, sectional area 30 sup. yds., curved all round through hard bluestone rock	15	0	24	0
Ditto, ditto, through granite, &c. ...	21	0	36	0
Ditto, through soft clay, slate, or shale...	10	6	18	9

Scappled stone at any Australian quarry.

Wages, 1s. 4d. per hour.

	Freestone. s.	d.	Bluestone. s.	d.
Footings in 12-inch through stones per perch	18	0	18	0
Parapet, scappled on both sides, per perch, 25 cu. feet	25	0	26	0
9-inch ashlar, 33 lin. ft., per perch ...	18	0	18	0

Rubble, per perch of 25 cubic ft. ...	3 0	4 0
Ballast, per perch	1 0	2 0
Lintels, steps or sills (ordinary) at per lin. ft.	0 8	0 10
Dimension stones, from 6 to 12 cu. ft., per cu. ft.	1 3	1 3
Ditto 12 to 24 do.	1 6	1 6
Ditto 24 to 36 do.	1 9	2 0
Ditto 36 to 60 do.	2 0	2 6
Hearth stones, freestone, from 4 to 6 ins. thick ... ... per sup ft.	0 8	0 0
Flag stones, various lengths do.	0 8	0 0
Cubes or paving stones, 4 x 9, x 12 or 15 inches ... ... per sup yard	4 0	7 0
9-inch pitchers, 9 x 9 x 9, per sup. yard	3 6	6 0
Curbs, for footpaths, &c., 15 x 6, p.l.f.	0 6	0 9
Ditto, 18 x 8	0 8	1 0

Although the stones are always quarried larger than the net size required, the latter only is paid for. If the stones are bevelled or angular, the largest dimensions square with each other are reckoned.

The above prices apply more particularly to Sydney, Parramatta, and Hobart Town for freestone, and Melbourne for bluestone, and include delivery within two miles of the quarry at these places, on account of the large and constant demand.

Bluestone cube stones, about 9 x 4 x 6 deep delivered in Sydney from Melbourne, for crossings, &c., per sup. yd., 12s.

	s.	d.
Boulders of trap rock loaded into railway trucks at the Nepean River, at 3s. 6d. per ton or per c. yard	4	6
2-inch Kiama bluestone, machine broken metal delivered in Sydney at 11s. 6d. per ton or per cu. yard...	14	0
Ditto, delivered at Leichhardt per ton	13	6
Ditto, from Pennant Hills, 10s per ton, or per cu. yard	13	0
2-inch bluestone, machine broken metal, delivered in Melbourne at 5s. 6d. per ton, or per cu. yd.	6	6
Bluestone screenings (screens from ¼ inch to 1 inch mesh) from Emu Plains delivered at Sydney Railway Station per ton 12s or per cu. yard	14	0

Nepean River gravel from Emu Plains about two fifths coarse sand up to ¼ inch, one fifth 1 inch gravel and two-fifths pebbles from 1½ to 4 inch gauge delivered in any part of Sydney at per ton 8 0

N.B.—One man will screen about 3 tons per hour. This gravel is largely used in Sydney, without screening or gauging, for the cement concrete under the hardwood block paving.

s. d.

White (quartz) metal from Five Dock, 2½ inch gauge, delivered in Newtown (about 3½ miles lead) at per ton 9s 3d, or per cubic yard ... 10 6

BROKEN ROAD METAL.

Labour only, per cubic yard.

Wages of stonebreaker, 1s. per hour.

The following prices for hand-broken metal are much higher than those really paid, because the gauges are at least 50 per cent. larger than they are known by.

s. d.

Bluestone or trap rock, broken to a 2½ inch ring gauge 5 0

Ditto 2 inch ditto 6 0

If hard sandstone, gritstone, brick or quartz, deduct one-third from each item

Wheeling and spreading within 20 lineal yards ... 1 8

For Quarrying and Carting, see EXCAVATION.

Stonebreaking machines will break about 4 cubic yards of 2-inch ring gauge bluestone per hour, with two men to supply the stone, &c., at about one-third the present cost of hand-breaking.

If *spalls* or small rubble can be obtained at a quarry within a mile of the machine, 2-inch ring gauge bluestone metal may be supplied and loaded into trucks or drays at a cost of 3s. 3d. per cubic yard.

The metal broken by these machines contains more dust than hand-broken metal, and is therefore not considered to be worth quite so much per cubic yard, although it is better adapted for railway ballast, and when used for road metal does not require blinding.

HOPE'S Stone-breaking Machine, requiring 8-horse power engine, will break, on an average, 5 cubic yards of 2-inch metal per hour. Its superiority is due mainly to its patent cubing jaws, which have been fitted to other machines with marked advantage.

In measuring ballasting for railways or tramways, the sleepers should be deducted for *net measure*.

WEIGHT OF RUBBLE AND METAL

Per cubic yard.

Granite rubble, about 30 cwt.
Bluestone rubble, from 28 cwt.
Sandstone, ditto, from 26 cwt.
2½ inch bluestone metal, about 26 cwt.
2 inch ditto about 25 cwt.
2½ sandstone metal, about 24 cwt.
2 inch ditto, about 23 cwt.
Sand or fine gravel ballast, from 22 cwt.
1 inch bluestone screenings, 23 cwt.

DRAINAGE.

DRAIN PIPES of glazed earthenware.

Laid complete per foot run.

	Lin feet. per ton.	Excavation. s.	d.	Materials. s.	d.	Laying only. s.	d.
3 inch pipes	404	0	2	0	5	0	2
4 inch	248	0	2	0	6	0	3
6 inch	142	0	3	0	7	0	4
9 inch	84	0	4	1	1	0	5
12 inch	56	0	5	1	8	0	6
16 inch	27	0	6	3	6	0	8
18 inch	22	0	7	4	6	1	0
21 inch	18	0	8	8	6	1	3
24 inch	14	0	9	11	0	1	8
6 inch flap traps, each		0	4	11	0	1	0
9 inch		0	6	17	0	1	3
12 inch		0	8	21	0	1	6
16 inch		1	0	26	0	2	0

The pipes and junctions average 2 feet long, bends and elbows about 18 inches long.

EXCAVATION.—This item is reckoned 3 feet deep by required width, including filling and ramming over pipes at 3s. per cubic yard. The cost of any other depth up to about 7 feet may be seen from this : if at the same price per cubic yard, 5 feet deep will be about double, and 7 feet deep about treble the price, on account of extra width at top required to lay the pipes.

MATERIALS.—This item includes the cost of the pipes delivered in Sydney or Melbourne with about 10 per cent. for clay joints.

Single junctions, sloping or square, tapered pipes, bends or elbows, 50 per cent. extra

Double junctions, 100 per cent., or double the price

Syphons, about 3 feet long each—4 inch, 4s., 6 inch, 7s 6d.

The price of drain pipes varies in Melbourne, but the average price is similar to those in Sydney which are here given.

By comparing the cost of 18 inch pipes laid complete as above with the cost of 18 inch plain culverts with ½-brick ring in cement at even £3 per cubic yard, it will be seen that it will be cheaper to build the latter with materials at hand than to pay extra for the cartage of pipes.

The larger size pipes appear to *greater* disadvantage as regards cost when compared with similar sized *culverts* with ½-brick ring in cement.

It is reported that 24-inch pipes at Wagga Wagga, Temora, Cootamundra, &c., have been replaced by half-brick culverts in cement.

CONCRETE.

Per cubic yard.

Wages 1s. per hour.

	s.	d.
Labour in mixing, wheeling, and casting lime concrete	3	6
Labour in gauging, mixing, wheeling, filling and ramming cement, sand, screenings and metal concrete...	7	0
Preparing deal casing for ditto at back of brick-work	1 0 to 2	0
Add extra for plank runs and staging ...	6d to 1	0
Breaking hard brick bats or clinkers for concrete	2 6 to 3	0

Cost of a cubic yard of concrete.

18 cu. ft, 2½ in., ballast 9 cu. ft. clean stone or gravel screenings, 7 cu. ft., sand mixed with 1 cask or 4.4 cubic feet of loose Portland cement ... ...

Labour in gauging, mixing, wheeling, filling and ramming, &c., as above ... ...

Net cost ...

N.B.—This shows 27 per cent. waste or shrinkage.

Lime concrete per cubic yard.

25 cu. feet 2 inch sandstone, with grit ; 6 cu. ft. sharp, or rock sand ; 5 cu. ft dry stone lime, passed through a ¼ inch sieve

Labour in sifting, mixing and filling ... ... 5 (

N.B.—This shows less shrinkage than the cement concrete, owing to the expansion of the lime.

Coke concrete for arches, per cubic yard.

	s.	d.
22 cu. ft. small coke or breese, 14 cubic feet of sand or coke dust mixed with one cask Portland cement		
Labour in gauging, mixing, wheeling, and ramming... ...	5	0

Concrete walls, per cubic yard.

22 cu. ft spalls or clippings, 14 cubic feet sandstone with grit, mixed with three bush. Portland cement, and rammed in the moulds	6	0

Labour in ganging, mixing, wheeling, ramming, adjusting mould, &c., per cubic yard ... ... 5 0 to 6 0

N.B.—The amount of material required for a cubic yard of concrete cannot be accurately ascertained without trial with the materials to be used. If a cubic yard of the coarse ballast or metal is first measured, the spaces can be filled up with fine sand or water, which can then be separated and measured. Stone or rich lime concrete shrinks from 20 to 23 per cent., and cement concrete from 23 to 27 per cent., compared with the loose, dry materials used.

Water required in mixing a cubic yard of cement concrete is from forty to fifty gallons.

Mem.—Whenever difficult forms present themselves in buildings, such as entrances with semicircular arches, circular on plan, or with convex jambs, &c., it will be found that cement rammed concrete is from one-half to one-third the cost of brickwork in cement, and equally strong.

TALL'S PATENT CEMENT CONCRETE, which is now being largely used in Great Britain as a cheap substitute for brick and stone work, is composed of about eight parts clean gravel or burnt clay to one part of Portland cement. It is equal in strength to brickwork in cement, and is even much cheaper than ordinary brickwork. It is built in moveable frames in courses about eighteen inches high, after the method pursued in constructing pisé houses. Its cheapness in Great Britain is mainly owing to the low price of Portland cement there. In many places it is delivered in 80 ton barges, &c., at 32s per ton, or about one-third the price in Sydney.

COKE CONCRETE.—Coke or breeze, and cement, has long been effectively used in Sydney and Melbourne as a concrete for floors, roofs, the coring of marble cement chimney-pieces, &c. It is well adapted for ceiling floors, arches, &c., on account of its lightness, and cheapness, being about half the cost of brickwork.

The Sydney blown sand is rounded and would be improved by mixing with coke dust (which is *hard* and *sharp*) when used for concrete or plaster.

CLAY PUDDLE.

Per cubic yard.

Wages of labourer, 1s per hour, with use of tools.

	s.	d.
Excavating for clay, getting, filling, and wheeling one stage, not exceeding 20 yards	2	3
Chopping and watering for tempering	1	0
Tempering after clay has been soaked	1	0
*Filling, wheeling one stage, tipping to place required, and treading	1	6
	5	9

	s.	d.
If unbearing is required to get at the clay, add per foot in depth to be removed	0	6

When the clay is tipped into, and can be tempered in the place required, leave out item marked thus*

Clay puddle, when properly prepared, should be similar to brick earth ready for moulding.

The use of tar concrete, coke dust and tar, mixed together in thin layers, would form an excellent substitute for puddle on the outside of cesspits, where clay is scarce ; it would also save excavation, as 2 inches of this stuff would be ample, instead of 9 inches of clay.

WOOD PAVING.

Sydney Streets.

	s.	a.
Removing old metal, &c., from one-half the street to a depth of 18 ins. (metal 9 to 12 ins.) and keeping site in repair during concreting other half of street, per cu. yd.	6	0
Concrete, viz., 18 cu. ft. 2 in. bluestone ; 14 cu. feet gravel and sand ; Portland cement, 1 cask mixed and rammed, per cu. yd.	40	0
Render 1 in. thick, with one-third cement and two-thirds clear sharp sand, per sup. yd.	2	6
Wood blocks, 12" x 3' x 6" deep, tarred at ends, laid with ¾ in. side joint, filled and caulked with tarred bluestone clean screenings, ¾ in. gauge, and sprinkled with bluestone dust	10	0
Bluestone sets for crossings, 9 x 4 x 6 deep, grouted with bluestone tarred screenings as before, per sup. yard	16	0

SCAPPLED STONE.

Delivered in Melbourne per cube foot.

Spring Bay (Hobart Town) free sandstone, up to 15 cubic feet	4	6
Waurn Ponds (Geelong) free limestone, any size...	2	9
Oamaru (N. Zealand) do up to 30 cu. ft.	3	0
Ditto do 60 do	3	6
Sydney free sandstone, up to 30 cu. ft.	3	3
Ditto do 60 do	4	0
Stawell sandstone, delivered at Melbourne... ..	3	6

Kapunda (S. Australia) marble do	3	6
Gabo Island red granite for columns, do	20	0
Harcourt grey granite (Mt. Alexander)	3	3
Barrabool Hills (Geelong) free sandstone in blocks	2	6
Ditto waste stone, worked up into ashlar facing, *broached* or diagonally chiselled face, square beds and joints to bond with brickwork, 14s 3d. p. s. y.	1	7
Ditto with pitched quarry face, 12s. do ...	1	4

SCAPPLED STONE.

delivered in Sydney per cube foot

	s.	d.
Moruya (N. S. Wales) grey granite 9 0 to	11	0
Bluestone (Malmsbury) up to 10 cubic feet ..	4	6
Ditto do 15 do	5	0
Ditto do 20 do	6	0
Ditto do 30 do	7	0
Ditto do 40 do	8	0
Port Chalmers stone about one-half the prices given for bluestone.		
Moruya (N. S. Wales) granite at quarry ... 3 0 to	4	0
Marulan do limestone do	1	2
Ditto do delivered at Goulburn	1	8
Cooma do grey soft granite at the quarries	1	6

SCAPPLED STONE, &c., IN LAUNCESTON.

	s.	d.
Sandstone at Launceston per cubic foot	3	0
Hearthstone ditto each (rough)	5	0
Window sills 12 x 6 at do	3	6
Primary grey stone. for rough curbing foundations, &c., per cube yard	5	0

SCAPPLED STONE, &c., AT HOBART

Tea-tree freestone up to 14 cu. ft. delivered at Railway Station, per cube foot	3	0
Knocklofty brown freestone in general use do. .. .. 2 0 to	2	6
Knocklofty rubble stone per 1 horse load	8	0

Carting bluestone, granite, or sandstone one mile, per ton (See "Weight of Materials")	2	0	
Add for each mile beyond, per ton	0	8	
Carting rubble per perch (measured in wall), one mile	2	8	to 3 0
Add for each additional mile	0	8	to 0 10

SAWING AND POLISHING.

Per foot super., each face.

Sawing Oamaru (N. Zealand) or Geelong freestone	0	5	
Sawing Sydney or Spring Bay free sandstone ...	0	7	
Marble, Italian or Marulan (N. S. W.), sawing or Polishing each	1	6	
Black marble ditto	2	6	
Polishing granite, Moruya, 3s., and Harcourt ...	5	0	
Sawing Malmsbury bluestone by hand	1	3	

Polishing columns or other circular work add extra. as for circular stone cutting see page 40. The prices stated for polishing do not include the necessary dressing required to prepare for it.

BLUESTONE, sawn by machinery, is now largely used in Melbourne and Sydney at a cheap rate. See page 42.

MASONRY.

Materials within 2 miles, per perch of 25 cu. feet.

	Sydney Sandstone £	s.	d.	Melbourne Bluestone. £	s.	d.
18" x 12' footings from 2 to 3 feet long, quarry dressed, except beds, which are rough-axed ...	1	10	0	1	15	0
Larger footings, quarry faces, with clean-axed or chiselled beds and joints	2	10	0	2	10	0
Hammer squared coursed rubble with 3 through stones per perch	0	15	0	0	18	0
Random rubble in walls or abutments, with 3 through stones ..	0	12	6	0	15	0
Ashlar pitched, quarry faced; axed beds and joints and 3 through stones	1	15	0	2	5	0

	Sydney. Sandstone. £	s.	d.	Melbourne. Bluestone. £	s.	d.
Ashlar church, warehouse, or school walls, neat axe and draft both sides, and with axed beds and joints	2	15	0	4	15	0
12 inch parapet walls, ditto ...	3	0	0	5	0	0
Ditto rough for plastering	2	0	0	3	5	0
Ashlar axe and draft outside and scappled inside for plastering, axed beds and joints	2	7	0	3	0	0
Buttresses cube stones, dressed 3 sides	3	5	0	5	10	0
If more than 10 feet high, add for each 10 feet in height ...	0	2	6	0	2	8

See Rules for Estimating, p. 40.

CULVERTS AND TUNNELS.

All Materials.	£	*s.*	*d.*
18 inch square hammer dressed, with true beds and joints (sandstone handy), per lin. yard ...	1	10	0
24 inch square ditto ditto do ..	2	0	0
5 to 10 feet culverts with rough radiating joints including the ends or faces of culverts, per cu. yd.	3	0	0
18 inch radiated masonry to tunnels, all through stones, curved picked face and boastered joints per cubic yard in sandstone	4	0	0

STONE CUTTING.

Labor only, per foot super.

	Spring Bay Sandstone s.	d.	Bluestone or Basalt. s.	d.	Sydney Sandstone. s.	d.
Rubbed sandstone or fine axed bluestone	1	6	3	0	1	3
Ditto sparrow picked or fine tool stroked	1	6	3	0	1	3
Clean chiselled sandstone or axe and draft bluestone	1	0	1	8	0	9
Ditto fine chiselled or tool stroked	1	2	2	4	1	0

	Spring Bay Sandstone		Bluestone or Basalt		Sydney Sandstone	
	s.	d.	s.	d.	s.	d.
Boasted or chiselled sandstone or axe dressed bluestone for beds and joints	0	5	0	8	0	4
Pitched quarry face	0	1	0	2	0	1
Vermiculated work, sharp arrises clean tooled	3	0	6	0	2	6
Ditto, ridges not tooled	2	3	4	6	2	0
Fretwork, inch bands, clean tooled	2	6	5	0	2	0
Ditto, 2 inch bands, ditto ...	2	0	4	0	1	8
Mouldings, tooled, large ...	2	0	4	0	1	8
Ditto, do, small ..	3	0	6	0	2	6

Gothic mouldings one-half more, on account of extra sinking and under cutting.

If in Cooma, N. S. Wales, soft granite, reckon the same as for bluestone.

If in Moruya, New South Wales grey granite, or Adelaide marble, or the Grampian (Victorian) granite, reckon one-half more than bluestone; but if in Gabo Island red granite, or Harcourt (Vic.), grey granite, reckon double the cost of similar work to bluestone. Oamara free limestone costs about one-half as much to work as Sydney sandstone.

The relative proportion for fine axed or finest chiselled plain face per super foot is for Oamaru or Adelaide free limestone 7d, Barrabool Hills or Darley free sandstone 9d.; Waurn Ponds free limestone, 11d.; Sydney free sandstone, 1s. 3d.; Spring Bay stone, 1s. 6d; Stawell sandstone, 2s. 3d.; bluestone, or Cooma granite. 3s.; Adelaide marble, or Grampian (Vic.), or Moruya (N. S. Wales) granite, 4s. 6d., and for Gabo Island or Harcourt granite, 6s. per sup. foot.

The Oamaru free limestone is similar to the South Australian free limestone (See Building materials of South Australia at the end of this book.) It has been quarried at Oamaru at 4d. per cube foot and a Theatre built there at 8d. per cube foot worked and set; this would be at the rate of 16s. 6d. per perch.—Like other soft lime freestone it is easily cut with a handsaw.

STONE CUTTING.

Labour only, per foot run.

	Sydney Sandstone.		Spring Bay Sandstone.		Oamaru Stone.	
	s.	d.	s.	d.	s.	d.
Single bead, reed or flute, $\frac{3}{4}$ inch or inch	0	6	0	8	0	3
Double do., do.	0	8	0	10	0	4
Treble do. or moulded	1	0	1	3	0	6

	Sydney Sandstone s. d.	Spring Bay Sandstone s. d.	Oamaru Freestone s. d.
Diminished flutes, including arrises, from 1 inch to 2 inches diam.	0 9	0 11	0 5
Ditto, from 2 to 3 inches do ...	1 0	1 3	0 6
Ditto, from 3 to 4 inches do ...	1 2	1 5	0 7
Ditto, from 4 to 5 inches do ...	1 3	1 7	0 8

MASONRY.

Holes jumped or drilled for bolts, &c., 1 or 1½ inch diameter	1 0	1 3	0 6
Ditto, do. 2 inches diameter ..	1 2	1 5	0 7
Ditto, do. 3 inches do. .. .	1 3	1 7	0 8
Ditto, do. 4 inches do.	1 6	1 10	0 9

STONE CUTTING.
Labour only, each.

	s. d.	s. d.	s. d.
Mortice for iron rails, &c., 1 inch sq. ...	0 5	0 6	0 3
Ditto, do 2 do	0 6	0 8	0 4
Ditto, do 3 do	0 9	0 11	0 5
Dentules, 2 inches deep on face, with band	0 5	0 7	0 3
Dittto, 4 do. do.	0 9	0 11	0 5
Triglyphs and guttæ or drops, for 12 inch Doric column	3 0	4 0	1 9
Ditto, 24 inch do.	4 6	5 6	2 6
Ball for foot or finial 6 inches diam. ...	7 6	10 0	4 0
Ditto, 8 do	9 0	11 6	5 0
Ditto, 12 do	10 6	13 0	6 0
Balusters, either round or square, if 4 inches largest diam., or side, and 12 ins. high...	9 0	11 6	5 0
Ditto, if 4 ins. diam., or side, and 18 ins. high...	10 0	12 6	5 3
Ditto, 8 ins. do. and 24 ins. do.	11 0	14 0	6 0

MORTAR AND MASONRY.—*Per perch.*

Rubble contains about 5 cubic feet of mortar; ashlar about 2 cubic feet, and solid masonry from 1 to 1½ cubic feet of mortar per perch. To obtain these proportions of mortar, use one bushel of sand for each cubic foot of mortar required, in addition to the usual proportion of stone lime.

PROPORTIONATE COST OF SUNK AND CIRCULAR WORK.

Sunk work, 3 inches deep, one-fourth more than similar straight work.

Sunk work 6 inches deep, one-half more.

Circular work, from one-third to one-half more than similar straight work.

Circular-circular or spherical, from two to four times, according to sharpness of curve.

SETTING CUBE STONES.

Labour and mortar, per foot cube.

Setting ashlar facing, 4½ in. to 14 ins. on bed and less than 1½ cube feet.	0	8
Setting freestone, bluestone, or granite in blocks not more than 3 cubic feet, including scaffolding or gantry	0	6
Ditto, if carved or moulded, do	0	7
Ditto, block, from 2 to 6 feet long, do.	0	8
Ditto, do. if moulded or carved	0	9
Ditto, do, if above 6 feet long	0	10
Ditto, do, if moulded or carved	1	0

For every 10 feet in height above 40 feet add one-third the above rates.

EXTRA LARGE STONES.—If the stones for cornice exceed 20 cubic feet each, add one-fifth extra to the dressing, on account of the difficulty in handling or turning the stone while being worked ; but if most of the stones in the building, viaduct, &c., are of a large size, and the tackle is sufficient to move them easily, it will be found cheaper to dress, hoist, and set large than small stones, because the beds and joints, and the time required for hoisting and setting, are less in proportion to the cubic contents of the former as compared with the latter. This remark applies to pine framing or gantry with travelling cranes, the cost of which is given under the head of Carpentry.

IN ESTIMATING the cost of CUBED or dimension STONE at per *cubic foot*, first take the average size of the stones required, and the cost of such stones delivered on the work. Take next the number of superficial feet of face-work on the stone, then the number of feet, super., of dressed beds and joints in the same stone, add the cost of setting the stone, and you cannot fail to arrive at a correct estimate of the net cost and description of masonry, to which add profit according to the total cost of the work and the time required to finish it.

The different portions of masonry should also be classed as follows, if estimating at per cubic foot :—

One-face work, as ashlaring, or common face-work, base courses, plinths, friezes, &c.

Two-face work, as quoins, imposts, architraves, parapets, &c.

Three-face work, as copings, strings, cornices, pilasters, &c,

Four or more face work, as newels and caps, to ditto, blocks to

cornices, chimney caps, &c. By such means the defective system of estimating may be pruned of much of its uncertainty; the proper, because the most correct method, being to estimate the rough stone at per cubic foot, and the labour in dressing at per foot super.

TIMED ESTIMATE.

An octagon pointed or pyramidal gate cap in Sydney freestone about 22 ins. by 22 ins. by 30 ins. high took a stonecutter 48 hours to dress it, or at the rate of 6 hours per cube foot; this at 1s 6d. per hour =9s. per cube foot for labour only without *sharps* or profit.

Tooled margins, if round rock, or quarry face, which is not measured, to be taken by the foot super., at double their width.

Raised work to be measured as *flat* work, the margins being taken as sunk work.

EXAMPLE OF ESTIMATING.

Stone Cornice (Sydney freestone) on 14 inch brick wall.

	s.	d
Stone delivered 2·0 x 1·0= 2 cube feet at 1s. 3d	2	6
Setting and mortar, 2 cubic feet at 9d.	1	6
Mouldings, 24 ins. girt, cut and rubbed, 2s ft. at 2s. 6d ...	5	0
Weathering, chiselled and rubbed, 1 sup. foot	1	3
Beds and joints, about 3 sup. feet at 4d	1	0
Per lineal foot	11	3

Or 5s. 7½d. per cube foot, = cost price.

CASTLEMAINE SLATE AND BLUESTONE.

Per foot super, in Melbourne.

	1 in.		1½ in.		2 in.		2½ in.		3 in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Rough slabs for coring	0	0	0	5	0	6	0	7	0	8
Flagging, squared only	0	0	0	10	1	1	1	2	1	4
Steps and sills, nosed and rubbed	0	0	1	9	2	0	2	3	2	6
Shelving rubbed both sides	1	6	1	9	2	0	0	0	0	0
Landings, squared and rubbed one side, up to 18 sup. ft.	0	0	0	0	0	0	1	9	2	0
Ditto, from 18 to 28 s. ft.	0	0	0	0	0	0	2	6	3	0
Hearthstones, squared and rubbed	1	2	1	4	1	6	1	8	1	10
Urinals, wine bins, shelves, &c., rubbed, grooved, and prepared for fixing	2	3	2	6	0	0	0	0	0	0

	s. d. 1 in.	s. d. 1½ in.	s. d. 2 in.	s. d. 2½ in.	s. d. 3 in.
BLUESTONE sawn and squared flagging ...	1 0	1 1½	1 2	1 3	1 4

If enamelled slates 1s. 6d. per foot extra measured on all faces.

	4 in. s. d.	5 in. s. d.	6 in. s. d.	7 in. s. d.	8 in. s. d.
Bluestone sawn and sqrd. landing up to 12 sup. feet	1 9	2 3	3 6	3 10	4 0
Ditto, from 12 to 18 do.	0 0	0 0	3 10	4 2	4 6
Ditto 18 to 28 do.	0 0	0 0	5 0	5 4	5 8

Ditto 28 to 40, by special agreement.

N.B.—For prices in Sydney add one fourth.

This slate flagging is much stronger than Caithness flagging which is stronger than bluestone flagging of equal thickness.

PAVING AND FLAGGING.

Labour only, per yard super.

	s. d.
Pitching or channelling with 9 in. pitchers in sand	0 10
Cube pitching with 4 x 9 pitchers ... do.	1 3
Bluestone curbing, 18 x 6, rough axed and laid p. l. y.	5 0
Ditto circular ditto ditto ... . 6 0 to	9 0
Laying 2 in. to 3 in. squared flagging, jointed in mortar, per sup. yard	1 0

ENAMELLED SLATE IN MELBOURNE.

	£ s. d.
Chimney pieces with 7 in. jambs	1 15 0
Ditto ditto 8 or 9 do. from... ...	47s. 6d. to 4 0 0
Ditto ditto 10 do.	84s. to 8 0 0
Ditto ditto 12 do.	170s. to 10 0 0
Ditto ditto 14 do.	250s. to 20 0 0
Ditto ditto 15 do.	250s. to 30 0 0
Baths capped and cased, 6 ft. 6 in. x 2 ft. 9 in. x 2ft. 6in ..	20 0 0
Plain form with inclined back, 6 ft. x 2 ft. x 1 ft. 10 in. ..	8 10 0
Plain slate tanks, 4 ft. x 2 ft. x 2 ft., to hold 100 gallons...	4 0 0

CHIMNEY PIECES IN SYDNEY.

	£ s. d.	£ s d.
Sicilian white marble from	2 10 0 to	11 0 0
St. Ann's marble ditto	5 5 0 to	13 0 0
Marble Fenders various,..	2 0 0 to	6 0 0

Per foot super.

	Melbourne s. d.	Sydney. s. d.
Marble slabs, all sizes, 1 in. thick polished	4 0	4 0
Ditto Tiles, black or white, 12 in. sq., laid in cement	5 0	5 0
Ditto, ditto, ditto, 8 in. sq. ditto ..	6 0	6 6
Slate Welsh, 1 in. slabs, squared and rubbed ...	2 6	3 0
„ „ 1¼ in. ditto ditto ...	3 0	4 0
„ „ 1½ in. ditto ditto ..	3 6	4 0
Minton's patent paving, various patterns, from ...	2 3	2 0
„ hearth tiles, 6 x 6 x 1 in.	9 0	9 0
„ ditto, 6 x 6 x ½ in.	6 6	7 0
„ bath and window tiles, ⅜ in.	2 6	2 6

The German encaustic tile paving is much cheaper than any other similar paving.

Machine dressed sandstone flagging, 6 ins. thick ..		1 6
Sandstone steps or cills, clean chiselled, p. l. foot ...		2 6
Bluestone 12 x 7 steps, axed ditto	3 0	4 0
Bluestone steps, 12 x 7, fine axed, with nosing, p. l. ft	4 0	5 0
Ditto, ditto, with moulded nosing	6 6	8 0
Ditto, sinks, per foot sup.	4 0	5 0
Ditto, curbing dressed and mortised for iron palisading, 12 in. x 7 in. per lin ft....	7 0	8 0
Sandstone dishstones, 18 in. x 18 in., with grid. ...		14 0

EACH.

Chimney pieces, rubbed slate, boxed with caps ...	50 0	65 0
„ 8 in. jambs, enamelled slate with trusses ...	60 0	75 0
„ pieces marble, ditto, ...	60 0 to	£150

SANDHURST GRANITE COLUMNS, &c.

Polished Shafts, with swell.

Per lin. foot.

	Melbourne s. d.	Sydney. s. d.
Small size columns, per sup. foot	40 0	45 0
Large size ditto	35 0	40 0
Tuscan column, 10 ft. (one stone) shaft with base and capital	£200	£225

STONE CARVING.

Labour only, each item

N.B.—If the hardest beds of the Sydney sandstone are used take the prices given for the Spring Bay stone.

	Spring Bay stone. £ s. d.	Sydney stone. £ s. d.	Oamaru. stone. £ s. d
Ionic capital, Grecian or Roman			
for 6 in. column (major diam.)...	2 12 0	1 14 0	1 6 0
Ditto 9 in. do. do. ...	3 15 0	2 10 0	1 17 0
Ditto 12 in. do. do. ...	5 0 0	3 10 0	2 10 0
Ditto 18 in. do. do. ...	7 0 0	5 0 0	3 10 0
Ditto 24 in. do. do. ...	10 0 0	7 0 0	5 0 0

For quarter pilasters, one half and for bases one-fourth the above. If enriched, add 20 per cent. to each item.

	Spring Bay stone.			Sydney stone.			Oamaru stone.		
	£	s	d	£	s	d	£	s	d
Modillions, Ionic, or plain moulded, 3 in. projection	0	4	6	0	3	0	0	2	3
Ditto 4½ in. do, plain moulded ...	0	6	0	0	4	0	0	3	0
Ditto, 6 in. do., do ...	0	7	6	0	5	0	0	3	9
Cantilevers or trusses, 9 in. do. do.	0	10	6	0	7	0	0	5	3
Ditto, 12 in. do. do.	0	15	0	0	10	0	0	7	6
Corinthian or composite capital for 6 in. (major diam) column ...	4	10	0	3	0	0	2	5	0
9 in. do. do. ...	7	10	0	5	0	0	3	15	0
12 in. do. do. ...	12	0	0	8	0	0	6	0	0
18 in. do. do. ...	16	0	0	12	0	0	8	0	0
24 in. do. do. ...	20	0	0	15	0	0	10	0	0
For quarter pilasters one half and for bases one fourth the above.									
Pateræ or rosette (rich), 4 in. diam.	0	7	6	0	5	0	0	3	9
Ditto 6 in do.	0	9	0	0	6	0	0	4	6
Ditto 9 in. do.	0	15	0	0	10	0	0	7	6
Centre flower (rich) 12 in diam.	1	2	6	0	15	0	0	11	3
Ditto 18 in. do. ...	1	17	6	1	5	0	0	18	9
Ditto 24 in. do. ...	2	15	0	1	17	0	1	7	0
Mask or head, 4 in.	0	9	0	0	6	0	0	4	6
Ditto 6 in.	0	18	0	0	12	0	0	9	0
Ditto 9 in.	1	4	0	0	16	0	0	12	0
Ditto 12 in.	1	10	0	1	0	0	0	15	0
Ditto 15 in.	1	17	0	1	5	0	0	18	0
Acanthus leaf, 4 ins. long... ...	0	6	0	0	4	0	0	3	0
Ditto 6 in. do. ...	0	9	0	0	6	0	0	4	6
Ditto 9 in. do. ...	0	12	0	0	8	0	0	6	0
Ditto 12 in. do. ...	0	15	0	0	10	0	0	7	6
Lotus leaves, one half the above.									
Oak or laurel wreath, 6 in. diam.	0	15	0	0	10	0	0	7	6
Ditto do 9 in. do.	0	18	0	0	12	0	0	9	0
Ditto do 12 in. do.	1	4	0	0	16	0	0	12	0
Per foot super.									
Oak leaf and acorn frieze, with leaves 2 in. long	1	7	0	0	18	0	0	13	6
Ditto do, 4 in. do.	1	1	0	0	14	0	0	10	6
Per foot run.									
Egg and dart moulding, 1½ in. girt.	0	4	6	0	3	0	0	2	3
Ditto do. 2 in. do.	0	5	3	0	3	6	0	2	8
Ditto do. 3 in. do.	0	6	0	0	4	0	0	3	0
Ditto do. 4 in. do.	0	6	9	0	4	6	0	3	5
Rope or cable moulding 2 in. do.	0	3	0	0	2	0	0	1	6
Ditto do. 3 in do.	0	4	6	0	3	0	0	2	3
Guillochis moulding, single, 3 in. circles	0	6	0	0	4	0	0	3	0
Ditto, 4 inches, ditto	0	7	6	0	5	0	0	3	9
Ditto, 6 inches, ditto	0	9	0	0	6	0	0	4	6
Ditto, enriched, add 50 per cent.									

N.B.—The whole of the above items are presumed to be prepared by the stonecutter as required, if not add 8 per cent. for the stone prepared and set when carved. See N.B. at head of this.

STONE CARVING, which is generally fixed at a considerable height above the observer, does not require that degree of finish or delicacy of outline required in wood carving, which is generally fixed much nearer to the eye. In all ornamental work the time required to model or carve a given *Piece* depends materially upon the degree of finish, or *minutiæ*, aimed at.

If any of the above items are required in Oamaru, Barrabool Hills, or South Australian freestone, the price will be about one half that given for Spring Bay stone; for bluestone twice the price of Spring Bay stone; and for Adelaide marble or Moruya granite about thrice the cost of Spring Bay stone.

N.B.—In stone cutting the superficial measurement or girt is always taken, but when let at one price with the material, the length and breadth only are taken, and not the girt, for superficial measurement. Generally when the materials and labour are let together the same measurement is taken as for materials only.

BRICKLAYER'S WORK.

Labour and Scaffolding per rod, reduced.

	£	s.	d.
Brickwork in circular tanks, culverts, cesspools or wells, ½ brick thick, including trammels and centres from ... ... £7 to	8	0	0
Ditto, 1 brick or more in thickness from £5 to	6	0	0
Brickwork in mortar for 4½ inch walls ... £6 to	7	0	0
Ditto, do. for 9 inch walls ... ... £4 to	5	0	0
Ditto, for 1½ brick walls ... ... £3 15s. to	4	10	0
Ditto, for walls 2 or more bricks thick £3 10s. to	4	0	0
Add if worked fair on both sides, per sup. rod	0	10	0
If in cement add one sixth			
If old bricks with bats are used, add 6s. to	0	10	0
Taking down brickwork, cleaning and stacking bricks, per rod ... ... 16s. to	1	2	0
Ditto, per 1000 bricks ... ... 4s. to	0	8	0

Add for mortar, cement or bricks, as per estimate.

The larger prices include flushing up all joints.

Extra haulage of materials.—Add one per cent. for every foot above 30 feet in height.

Per lineal foot.

Gauge No.	Weight in lbs.	Width in inches.	Gauge No.	Weight in lbs.	Width in inches.
13	0.62	2	16(1-16th)	0.26	$1\frac{1}{4}$
14	0.47	$1\frac{3}{4}$	17	0.21	$1\frac{1}{8}$
15	0.36	$1\frac{1}{2}$	18	0.16	1
15	0.34	$1\frac{3}{8}$	19	0.12	$0\frac{7}{8}$

To find the value of a rod of Brickwork.

	£	s.	d.
4,080 bricks, of 4 courses, equal 13 ins. at per thousand			
4,400 bricks, of 4 courses, equal 12 ins.			
$3\frac{1}{2}$ to 4 hogsheads of water, according to *fatness* of lime...			
18 bushels of stone or roche lime, at per bushel ...			
3 or 2 loads of sand as specified, 18 bushels, per load ...			
lbs. hoop iron (if required) as per table			
"Labour only," as above			
Cost price per rod			
Add per cent, profit			
Contractor's price ... . £			

Having ascertained the price per rod as above, any alteration in the price of bricks can be allowed for at the rate of 4s. per rod for each shilling per 1000.

	£	s.	d.
Brickwork in cement at Fort Bourke.			
Bricks, £14; labor, £7; cement, 6 casks, at 30s. = £9			
48 bus sand, and 126 gals. water, £1	31	0	0
Brickwork in mortar. $\frac{1}{3}$ lime ditto—			
Bricks, 4000 at 70s = £14; labor, £5; Adelaide lime,			
£4; sand and water, £1	24	0	0
Brickwork, Sydney, $\frac{1}{3}$ lime mortar—			
Bricks, £13; labor, £5; marble lime, 48s; sand, 3 loads,			
or 54 bush. 12s,; water laid on, 1s.	21	1	0
Brickwork, faced with double pressed bricks			
Add extra cost of 1500 bricks and 6s. to 12s. per 100, for such of the 1500 face bricks as may be laid ornamentally to pattern, in proportion to cutting and fitting.			

If the brick facing or face bricks are measured separately, half the depth of the reveals are included in the measurement.

BRICKWORK.

One rod of Brickwork contains

272½ feet super, of $1\frac{1}{2}$ brick or $13\frac{1}{2}$ inches in thickness,
Or $11\frac{1}{3}$ cubic yards, or 306 cubic feet.

BRICKS—4,356 best bricks in mortar laid four courses to the foot,
4,080 bricks of 4 courses to 13 inches, or ordinary brickwork,

MORTAR—48 bush of sharp sand, and 24 bush. of stone lime.
Or 2⅔ loads of sharp sand and 6 barrels of Portland cement.
BOND—71 lbs. iron hoop No. 16, at 272 lineal feet per rod.
WATER—200 gals. for mortar and 400 gals. for wet bricks=600 gals. at 1s. 6d. per 1000 gals = about 1s. per rod.
Brickwork in cement contains about as many cubic feet of cement mortar as it took bushels of sand to make the mortar used, but brick in lime mortar contains as many cubic feet of lime mortar as it took bushels of sand and lime to make the mortar. This difference in bulk is owing to the expansion of *roche* or rich lime mortar about 3 per cent, and requires one-fourth more water per rod than is absorbed by cement mortar which only requires 162 gallons or 3 hogsheads per rod.
WEIGHT.—The Australian bricks generally weigh at least 7 lbs. each, or not less than 3 tons per thousand, say 13 tons per rod, the mortar weighing about 3 tons at 24 cubic feet per ton. The rod of brickwork may therefore be considered to weigh about 16 tons, or about 28 cwt. per cubic yard.

BRICKWORK.

Labour and Scaffolding, per cubic yard. s. d.

Brickwork in bridges, abutments, &c., not less than 1½ brick thick	7	0
Arches, large culverts, or Skew bridges	8	0
Ditto or culverts 1 brick or 9 ins. thick	10	0
Piers, small and lofty, 4 sides plumbed	18	0
Coppers, ovens, furnaces, cupolas, or half-brick culverts ... ... 12s. to	16	0
Factory chimneys, square, any height below 60 ft.	12	0
Do. circular, do.	14	0
Do. octagon, do. or church spires	16	0
Brickwork in cement with wet bricks for curved arches, circular on plan per cu. yd. from 40s. to	50	0

Chimneys more than 60 ft. high, add one per cent. for every extra foot.
If built from the inside, deduct 20 per cent.
If in cement, add one-sixth to these items.

Materials Required for a Cubic Yard of Brickwork.

384 bricks 4 courses to the foot.
360 bricks 4 courses to 13 inches
1½ bushels of cement or stone lime and 3 of sand, with joints averaging ⅜ inch thick
1 bushel cement or stone lime and 2 of sand, with joints averaging ¼ inch thick.
2 bushels cement or stone lime and 3 of sharp sand with joints 5-16 inch thick, the usual thickness for first-class work.

N.B.—Although a cask of cement does not average more than 3½ bushels or 4.4 cubic feet, in these calculations it has been assumed at 4 bushels and this is found to work out in practice.

BRICK BEAMS IN CEMENT on T. iron lintels laid flat may be safely used for square-headed openings, the iron lintels being supported until the cement sets. Wooden lintels should be avoided in first-class work as their shrinkage (especially if Colonial hardwood) often cause cracks in the walls. The extra cost is trifling e.g. 10 feet span in 14-inch walls—4 stringy bark 8 x 2½ joists 11½ feet long, blocked out and bolted, will support without deflection 78 cwt. (= ⅛ breaking weight equally distributed) fixed about 43s.

T. iron of corresponding strength, viz., 3 lengths each, 4 ins. deep and 4 ins. bottom flange x ½ in. thick = 441 lbs. at 2½d, per lb. fixed = 92s., shewing only 49s. extra for a 10 feet opening.

CIRCULAR TANKS, WELLS, SHAFTS, OR CULVERTS.

Table showing earth to be removed, number of bricks (4 courses to 13 inches), and contents in gallons; also cost at 60s. per cube yard for brickwork in cement (1 to 2), for each foot in depth.

	Half-brick Thick.			One Brick Thick.			
Clear diam. feet. in.	Earth cube ft.	Bricks, per foot.	Cost, at 60s. s. d.	Earth, cube ft.	Bricks, per foot	Cost. at 60s. s. d.	Gallons, per foot. in depth.
2·3	7	44	7 4	11	100	16 8	24·6
2·6	9	48	8 0	13	110	18 4	30·6
3·0	12	57	9 6	16	126	21 0	44·0
3·6	14½	65	10 10	20	142	23 8	61·0
4·0	18	73	12 2	24	158	26 4	73·3
4·6	22	82	13 1	28½	174	29 0	99·1
5·0	26	90	15 0	33½	190	31 8	122·3
5·6	31	98	16 4	38½	206	34 8	148·0
6·0	36	107	17 10	44½	222	37 0	176·2
6·6	41½	115	19 2	51	238	39 8	206·8
7·0	48	123	20 6	57	254	42 4	239·8
8·0	61	140	23 4	71	286	47 8	313·2
9·0	75	150	25 0	87	310	51 8	396·5
10·0	91	160	26 8	104	340	56 8	489·5

Semi-circular domes contain the same number of bricks as an equal height of the sides or barrel, *e.g.* a semi-circular dome of 10 ft. diam. and one brick thick contains 340 x 5 = 1700 bricks.

The price given for tanks, &c., one brick thick, would include the excavation in earthwork at Sydney or Melbourne prices.

BEVELLED BRICKS are sometimes used for small wells and tanks by which the labour of cutting the ends of the bricks is saved, and a finer joint obtained. If built with half brick rim the inner face of 9 inch bricks will measure as follows, viz :—

Clear diam.		Clear diam.		Clear diam.	
Feet.	Inches.	Feet.	Inches	Feet.	Inches.
$1\frac{1}{2}$	6	3	$7\frac{1}{4}$	$4\frac{1}{2}$	8
2	$6\frac{1}{2}$	$3\frac{1}{2}$	$7\frac{1}{2}$	5	$8\frac{1}{8}$
$2\frac{1}{2}$	7	4	$7\frac{3}{4}$	6	$8\frac{3}{8}$

CIRCULAR TANKS AND SHAFTS.

Table showing earth to be removed, number of bricks (4 courses to 13 ins.), and contents in gallons for each foot in depth; also number of bricks in semi-oval domes, with rise equal to one quarter the span.

Clear diam. feet	One Brick Thick.			One and a-half Brick Thick.			Gallons each foot in depth
	Earth, cu. feet	Number of Bricks.		Earth, &c cu. foot	Number of Bricks.		
		Semi-oval dome.	Each foot in depth		Semi-oval dome.	Each foot in depth	
10	104	900	350	118	1490	540	409
11	123	1070	380	138	1770	590	594
12	144	1280	410	160	2090	640	706
13	164	1470	440	183	2390	690	831
14	184	1670	471	208	2700	740	962
15	214	1900	503	234	3100	790	1106
16	241	2160	535	262	3520	835	1256
17	269	2470	566	292	3980	885	1419
18	299	2780	597	323	4400	930	1589
19	331	3080	628	355	4880	975	1775
20	364	3400	650	389	5400	1025	1963

N.B.—The above domes are intended to be circular on plan and semi-oval in section, with man-hole in the centre. The 10 feet semi-oval dome requires only 900 bricks, while the semi-circular dome, of the same diameter, requires 1800 bricks. The brickwork of Sydney and Melbourne generally averages 10 bricks to the sup. foot, one brick thick. It will also be found that circular domes contain the same number of bricks as an equal height of the tank they cover provided they are of the same thickness.

Bricks and lime or cement will not properly combine unless the bricks are soaked with water immediately before being used. If this is done the work will never give way in the joints. A similar, but less effective result, may be obtained by watering dry walls before the mortar or cement is set, or partially so by grouting.

GAUGED ARCHES.

Labour, putty, and centering, per foot super.

	Cut and Set.		Cut only.	
	s.	*d.*	*s.*	*d.*
Camber, semi or circular arches, rubbed and set in putty	1	8	1	0
Elliptical, or Gothic ditto	2	0	1	3
Ditto, circular on plan	3	0	2	0

Add cost of rubbers for "All materials."

To find the level width of impost, without marking out, multiply the half span of arch by depth or thickness of arch, and divide by the radius—*e. g.*, if the half span is 18 ins., the arch 1 brick thick and radius 72 ins., the level width of impost will be $\frac{18 \times 9}{72} = 2\frac{1}{4}$ in.

POINTING.

"All Materials," per yard super.	*s.*	*d.*
Flat joint or white pointing, including raking out and scaffolding	2	0
Ditto, to chimney shafts, do, up to 50 ft. high ..	3	0
Tuck pointing to new work and scaffolding ..	4	0
Ditto, to old work, including raking out, cleaning, staining, and scaffolding	6	0

BRICK-NOGGING.

	Lime Mortar.		Labour.	
	s.	*d.*	*s.*	*d.*
Brick on edge	0	6	0	8
Ditto, flat	0	9	1	0
If done in cement, add on the edge ..	0	3	0	4
Ditto, on the flat	0	4	0	6

In measuring brick-nogging to partitions, &c., the quartering is not deducted.

45 bricks flat, or 30 on edge, required per yard.

Brick-nogging is seldom used in Australia, not only on account of the difficulty of getting seasoned hardwood, but because it costs more than half-brick walls in cement, which, if built with wet bricks, will be stronger and more durable.

MOULDED BRICKWORK.

Moulded brickwork, built with moulded bricks at £6 per 1000, will cost only one-half similar work in Sydney freestone, one third the cost of Hobart Town freestone, one-sixth the cost of bluestone, and from one-tenth to one-eighteenth the cost of similar work in granite.

PAVING.

Per yard super.	Lime or Cement. s.	d.	Labour. s.	d.
Bricks flat in sand, laid straight or herring bone	0	3	0	9
Ditto, on edge, in ditto	0	4	1	0
Ditto, flat in mortar and jointed do ...	0	7	1	2
Ditto, on edge, do.	0	10	1	8
If laid flat in cement, add on mortar. ...	0	4	0	3
Ditto, on the edge...	0	6	0	4
9, 10, or 12 inch tiles, in mortar... ...	0	6	1	0
3 inch layer lime and sandstone or brick concrete	0	8	0	4
Ditto, do. cement do.	1	0	0	6

Paving for water channels or open drains, add from one-fourth to one-half for extra labour.

N.B.—34 bricks paved flat, 50 on edge, $5\frac{3}{4}$ fifteen-inch, 9 twelve inch, 13 ten-inch, and 16 9-inch tiles, will pave one yard.

The concrete forms a foundation to the brick paving and prevents it giving way or partially sinking.

SUNDRIES.

Per foot run.	s.	d.
Cuttings to 9 inch rakes or ramps	0	2
Ditto 14 inch do. do.	0	3
Ditto 18 inch do. do.	0	4
Chamfering angles	0	2
Cement filleting all materials	0	3
Waterproof course slates and cement	0	6
Ditto, 2 layers of slates and cement...	0	10

Each.	Materials. s.	d.	Labour. s.	d.
Bedding and pointing sash and door frames	0	4	1	8
Ditto, large or Venetian frames ...	0	6	2	6
Chimney-pots fixed, large or first size, in cement, to new buildings	10	0	2	0
Ditto, do., second size, do.	8	0	1	9
Ditto, do., third size, do.	6	0	1	6
Bedding hearths, including $\frac{1}{2}$ brick trimmers, or slates and iron bars ...	4	0	3	0
Setting register stoves complete ...	3	0	3	0
Ditto, colonial ovens, from	4	0	6	0

	Materials	Labour.
Building brick hearth and hobs, from	4 0	6 0
Setting copperboilers, from	15 0	15 0

Add cost of copper and fittings.

Register stoves are seldom set in brickwork, but merely placed against the jambs and secured by the mantlepiece.

BRICKWORK.

In measuring brickwork all flues are to be measured as solid work below the roof, but above the roof (for labour only) the girt is taken by the thickness of brickwork round flue, and this multiplied by the height, including projections which are girted. Piers, pilasters, quoins, &c., are also girted for labour only.

The shortest method of reducing cubic feet to the standard thickness of 1½ brick, is to deduct one-ninth, or multiply by 8 and divide by 9.

To reduce 1 brick to 1½ brick walls, deduct one-third from the given area.

In measuring height of walls, the wall-plate is included for setting or allowed for separately.

Labour only.—Doorways and other openings are not deducted, except more than 36 super. feet each when half the area is deducted for labour only.

"Labour only" is understood to include the erection of necessary scaffolding, centering, &c., but not providing it.

"Lime (or cement) and mortar" includes scaffolding, centering, moulds, templates, and all materials except bricks.

"All materials" includes lime and mortar and bricks, when all openings are deducted in the measurement, and arches, &c., allowed for. This is the English and standard method; but there is a growing disposition in Sydney, &c., not to deduct ordinary openings, nor allow for arches (to facilitate calculations), the price being fixed accordingly.

Brick walls if classified together according to their thickness, admit of a more equitable estimate being made than by the common method.

If reckoned by the square the measurement and calculation would be greatly simplified.

In buildings, brickwork is generally let by the rod of 272¼ super. feet reduced to 1½ bricks thick, or 306 cubic feet; but for factory chimneys, bridges, culverts, &c., the cubic yard is used.

HOLLOW BRICKWORK.—Walls are sometimes built hollow with ordinary bricks, and a considerable saving of material may in this way be effected in the construction of 9, 11, 12, and 14 inch walls, but there is an extra amount of labour.

If dry walls are to be obtained by building them hollow, the outer and inner walls must be joined by iron cramps, which makes the cost much heavier than for solid walls

When brickwork is let for "Labour only," and half-brick walls are neither shown or specified, if afterwards built it is usual to measure them as 9-inch walls.

TABLE SHOWING THE NUMBER OF BRICKS REQUIRED FOR WALLS *of all areas at* 4,030 *bricks per reduced rod.*

Area of wall.	Bricks thick and bricks required.				
	½ brick.	1 brick.	1½ brick.	2 bricks.	2½ bricks.
1	5	10	15	20	25
2	10	20	30	40	50
3	15	30	45	60	75
4	20	40	60	80	100
5	25	50	75	100	125
6	30	60	90	120	150
7	35	70	105	140	175
8	40	80	120	160	200
9	45	90	135	180	225
10	50	100	150	200	250
20	100	200	300	400	500
30	150	300	450	600	750
40	200	400	600	800	1,000
50	250	500	750	1,000	1,250
60	300	600	900	1,200	1,500
70	350	700	1,050	1,400	1,750
80	400	800	1,200	1,600	2,000
90	450	900	1,350	1,800	2,250
100	500	1,000	1,500	2,000	2,500
200	1,000	2,000	3,000	4,000	5,000
300	1.500	3,000	4,500	6,000	7,500
400	2,000	4,000	6,000	8,000	10,000
500	2,500	5,000	7,500	10,000	12,500
600	3,000	6,000	9,000	12,000	15,000
700	3,500	7,000	10,500	14,000	17,000
800	4,000	8,000	12,000	16,000	20,000
900	4,500	9,000	13,500	18,000	22,500
1,000	5,000	10,000	15,000	20,000	25,000
2,000	10,000	20,000	30,000	40,000	50,000
3,000	15,000	30,000	45,000	60,000	75,000
4,000	20,000	40,000	60,000	80,000	100,000
5,000	25,000	50,000	75,000	100,000	125,000
6,000	30,000	70,000	90,000	120,000	150,000
7,000	35,000	70,000	105,000	140,000	175,000
8,000	40,000	80,000	120,000	160,000	200,000
9,000	45,000	90,000	135,000	180,000	225,000
10,000	50,000	100.000	150,000	200,000	250,000
20,000	100,000	200,000	300,000	400,000	500,000
30,000	150,000	300,000	450,000	600,000	750,000
40,000	200,000	400 000	600,000	800,000	1,000,000
50,000	250,000	500,000	750,000	1,000,000	1,250,000

Table showing the value from One, to Two Hundred and Seventy-two Feet of reduced Brick Work, from £3 to £12 per Rod.

Feet.	At £3 per Rod.			At £4 per Rod.			At £6 per Rod.			At £8 per Rod.			At £10 per Rod.			At £12 per Rod.		
	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
1	0	0	2½	0	0	3½	0	0	5	0	0	7	0	0	9	0	0	10½
2	0	0	5	0	0	7	0	0	10½	0	1	2	0	1	5½	0	1	9
3	0	0	8	0	0	10½	0	1	4	0	1	9	0	2	2	0	2	7½
4	0	0	11	0	1	2	0	1	9	0	2	4	0	2	11	0	3	6
5	0	1	1	0	1	5½	0	2	2	0	2	11	0	3	8	0	4	5
6	0	1	4	0	1	9	0	2	8	0	3	6	0	4	5	0	5	3½
7	0	1	7	0	2	1	0	3	1	0	4	1	0	5	2	0	6	2
8	0	1	9	0	2	4	0	3	6	0	4	8½	0	5	10½	0	7	0½
9	0	2	0	0	2	8	0	3	11½	0	5	3½	0	6	7	0	7	11
10	0	2	3	0	2	11	0	4	5	0	5	10½	0	7	4	0	8	10
15	0	3	4	0	4	5	0	6	7	0	8	10	0	11	0	0	13	3
20	0	4	5	0	5	10½	0	8	10	0	11	9	0	14	8½	0	17	8
25	0	5	6	0	7	4	0	11	0	0	14	8½	0	18	4½	1	2	0½
30	0	6	7	0	8	10	0	13	3	0	17	8	1	2	1	1	6	6
40	0	8	10	0	11	9	0	17	8	1	3	6	1	9	5	1	15	3½
50	0	11	0	0	14	8½	1	2	1	1	9	5	1	16	9	2	4	1
60	0	13	3	0	17	8	1	6	5½	1	15	3½	2	4	1	2	12	11
70	0	15	5	1	0	7	1	10	10½	2	1	2	2	11	5½	3	1	9
80	0	17	8	1	3	6	1	15	3½	2	7	0½	2	18	10	3	10	7
90	0	19	10	1	6	5½	1	19	8½	2	12	11	3	6	2	3	19	5
100	1	2	1	1	9	5	2	4	1	2	18	10	3	13	6	4	8	2
110	1	4	3	1	12	4	2	8	6	3	4	8	4	0	10½	4	17	0½
120	1	6	6	1	15	3½	2	12	11	3	10	7	4	8	3	5	5	10½
130	1	8	8	1	18	3	2	17	4	3	16	5½	4	15	7	5	14	8½
140	1	10	11	2	1	2	3	1	9	4	2	4	5	2	11	6	3	6
150	1	13	1	2	4	1	3	6	2	4	8	3	5	10	3½	6	12	4
160	1	15	4	2	7	0½	3	10	7	4	14	1	5	17	8	7	1	2
170	1	17	6	2	10	0	3	15	0	5	0	0	6	5	0	7	10	0
180	1	19	9	2	12	11	3	19	5	5	5	10½	6	12	4	7	18	10
190	2	1	11	2	15	10½	4	3	10	5	11	9	6	19	8	8	7	8
200	2	4	1	2	18	10	4	8	3	5	17	8	7	7	0½	8	16	5½
210	2	6	4	3	1	9	4	12	8	6	3	6	7	14	5	9	5	3½
220	2	8	6	3	4	8½	4	17	0½	6	9	5	8	1	9	9	14	1
230	2	10	9	3	7	8	5	1	5½	6	15	3½	8	9	1	10	2	11
240	2	12	11	3	10	7	5	5	10½	7	1	2	8	16	5½	10	11	9
250	2	15	2	3	13	6	5	10	3½	7	7	0½	9	3	10	11	0	7
260	2	17	4	3	16	5½	5	14	8½	7	12	11	9	11	2	11	9	5
270	2	19	7	3	19	5	5	19	1½	7	18	10	9	18	6	11	18	3
272	3	0	0	4	0	0	6	0	0	8	0	0	10	0	0	12	0	0

By adding, halving, or doubling, as may be requisite, any quantity or value can be obtained from the above Table.

	s.	d.
Carting bricks, including loading and unloading, one mile per 1,000, with 2 horse loads	7	6
Ditto, add for each mile beyond, per 1,000.. ..	1	6
Ditto with 1 horse drays ditto	8	6
Ditto for each extra mile	1	9
Carting slates, sand, lime, or rubbish, per load for one mile, including loading and unloading ..	3	0
Ditto, add for each mile beyond, per load.. ..	0	8
Carting scaffolding, per load, for one mile, including loading and unloading..	3	6
Ditto, for each mile beyond first mile, per load ..	0	9

BRICKLAYERS' MATERIALS

	Sydney. £	s.	d.	Melbourne. £	s.	d.
Patent pressed white bricks	5	10	0	5	10	0
Suburban common bricks... ... £2 12s. to	3	0	0	2	10	0
Firebricks, imported	8	0	0	10	0	0
Colonial firebricks	6	0	0	7	0	0
Splayed, chamfered, or moulded bricks for columns, chimneys, or wells, or gauged arch-bricks Sydney double pressed from £5 to	9	10	0	3	0	0
Colonial firelumps, p. s. ft. 1 in. thick ..	0	0	10	0	0	10
English do. do.	0	1	3	0	1	3
Fireclay, colonial, per ton	2	0	0	7	0	0
Flooring tiles, 12 x 12 per 100	2	10	0	2	10	0
Ditto do. 9 x 9 do	1	5	0	1	5	0
Ditto do. 6 x 6 do	0	15	0	0	11	0
4 inch surface drain, per foot	0	0	5	0	0	5
6 inch do.	0	0	6	0	0	7
Chimney pots, clay, octagon	0	10	0	0	12	0
Ditto, do. small, 5s. medium	0	9	0	0	9	0
Ditto round	0	4	0	0	4	0
Damp proof bricks, 9 x 9 each...	0	0	6	0	0	6
Ditto, do. 9 x 4½	0	0	4½	0	0	4½
Air bricks, per dozen (*terra cotta*)	0	5	0	0	5	0
Oven tiles, 12 x 12 x 2 each	0	1	6	0	1	6
Ditto, 9 x 9 x 2	0	0	8	0	0	10
Shell lime, for inside work, per bag	0	3	0	0	3	0
Stone or roche lime, for outside work, do. ...	0	5	0	0	4	0
Portland cement, best brands, per cask of 4 bushels (96 lbs. per bushel)	0	15	0	0	13	0
Clean sharp sand, within a mile, filling and cartage only, per load	0	3	6	0	5	0
Adelaide stone lime at Wilcannia, per ton ...	7	10	0			

	Launceston.
Bricks, common per 1000	2 10 0
Stone lime per bag	0 4 0
Portland cement per cask	0 19 0
	Hobart.
Bricks, common, per 1000	2 15 0
Ditto, machine pressed to work 4 courses per foot	3 15 0
Lime Risden fat stone per bushel	0 1 0
Bridgewater weak hydraulic lime	0 1 0
Portland cement per cask	1 0 0
Bricks, common, at Tamworth, N. S. W. per 1000	2 6 0

TERRA COTTA. — Vases 2.4 x 1.8 = 40s. 2.2 x 1.3 = 30s. *Finials* 2.10 x 1.3 = 25s.

Trusses per pair 1.6 x 10½ in. = 12s. 6d. 10 in. x 8 in. = 7s. 6d. per pair.

Chequered glazed tiles 12 x 6 x 2 each 2½d.

STONE LIME *per ton from Piper's Flat.*

Delivered at the Western Railway Stations by railway trucks, viz :—

	£ s. d.
Ben Bullen, Wallerawong, Bowenfels and Lithgow ..	1 10 0
Capertee, Rydal, Tarana and Clarence Siding	1 12 0
Kelso, Bathurst and Mount Wilson	1 12 6
Blackheath, Katoomba, Springwood, Penrith and South Creek...	1 15 0
Liverpool, Campbelltown, Rookwood, Homebush, Burwood, Croydon, Ashfield, and Petersham	1 17 6

LITHGOW VALLEY POTTERY.

As the articles made at the above works are of a superior description, and supply a large district embracing the counties of Cook, Westmoreland, Roxburgh, Bathurst, &c., I deem them worthy of special reference.

The following are the prices at the Works, including delivery on the railway trucks :—

BRICKS, per 1000 common, 42s. ; white or brown pressed, £4 ; white or brown, moulded to any pattern, £5 ; fire bricks (very good, white), £5 ; size of pressed bricks, 9 x 4¼ x 2¾, and weight 7¼ lbs. each. The brown bricks are glazed and waterproof.

FIRE LUMPS, all sizes : Lump 42 x 12 x 8, 25s. ; also extra large size, 39 x 32 x 3½, 28s. These are at the rate of 11d. per super. foot, 1 inch thick.

Agricultural or drainage pipes, per 1000, viz., 2 in., 60s. ; 3 in., 100s. ; 4 inch, 160s. ; 6 in., 4d. per foot.

DRAIN TILES, 12 x 4 at 3½d., and 12 x 6 at 5d., and 9 in. semi-cir. tiles, 4½d. per lin. foot.

Inches diam...	3	4	6	9	12	15	18	21	24
Price per foot...	4d.	5d.	6d.	1s.	1s. 6d.	3s.	4s.	7s. 6d.	10s.
Feet, per ton ...	350	240	142	76	47½	38	25½	21½	16⅛

Junctions, sloping or square, taper pipes, bends and elbows, each 50 per cent. extra ; double junctions double price.

STONE WARE, each : Closet pans, 5s ; traps, 2s. 6d. ; syphons, 4 in., 3s. 6d. ; 6 in., 7s. 6d. ; large round chimney pots, 13s. ; small, 7s to 11s. 6d.

TERRA COTTA.— Balcony and garden vases, keystones, archstones, trusses, capitals of columns, &c.

PAVING TILES, 12 x 6 x 2½, glazed and chequered, 5d. per sup. foot ; ditto paving bricks, £5 5s. per 1000, or 3s. 9d. per sup. yard ; plain paving tiles and oven tiles, up to 18 x 12 x 2½ at 1s. 6d. per sup. foot.

FREIGHT by Great Western Railway to Sydney, for bricks, 8s. per ton, or about 26s. per 1000 ; pipes, per ton, 9s. 5d. For freight to other stations (Bathurst, &c.) See Index for Railway Freight and weight of Building Materials.

SLATING.

MEASUREMENT, *if not otherwise stipulated.*

To the net area covered add the length of the eaves by 1 foot wide ; also the length of all cuttings to hips, valleys, dormers, chimneys, &c , by 6 inches wide.

Circular slating, one-third to one-fourth, extra for labour, but for materials according to actual waste in radiating the sides, &c.

Lap or Cover.—The following table is calculated for a lap or cover of 4 inches, with two metal nails to each slate.

SLATERS' WORK.

TABLE.

Showing the number of slates required, and their weight per 1000 *and per square, including the number of lineal feet of battens per square for a* 4 *inch lap or cover.*

	Weight per 1000, Cwt.	Number required per square.	Battens per square. lineal feet.	Weight per square Cwt.
Duchess, 24 x 12 ..	50	120	120	6 cwt.
Countess, 20 x 10 .	33⅜	182	150	for
Viscountess, 18 x 10	30	208	175	4 inch
Ladies, 16 x 8 ..	20⅞	300	200	lap.

The number of slates per square does not include eaves or cuttings, which must be included in the measurement.

SLATING.—*Per square.*

	Welch slates and battens. £ s. d.	Amer. slates and battens. £ s. d.	Labour and metal nails. s. d.
Duchess, 24 x 12 at £20 p. 1000 ...	2 12 0		9 0
Countess, 20 x 10 at £10 p. 1000 ...	2 15 6	2 1 0	11 0
Viscountess, 18 x 10 at £12 p. 1000.	2 15 3	2 2 0	12 0
Ladies, 16 x 8 at £8 p. 1000 ...	2 16 0		13 0

For fancy cut slating reckon from one-third to one-half more for the labour, which includes nailing on the battens.

For stripping roofs reckon one-half the given prices for "Labour and metal nails."

The above table shows the price of Amer. Countess slating at £2 12s. per square, viz., 41s. and 11s. The other size slates are very rarely imported. Welch slating is from 10s. to 15s. per square extra. The deal battens are reckoned as 1½ x 1 (at 3s. per 100 lin. feet), if they are wider than this they are apt to curl up with the heat and loosen the slates. It is the custom for slaters here to nail on, and sometimes find the battens. The price of slates varies considerably according to the supply and demand.

If the slates fit closely, 2½ inch lap is sufficient. The larger the lap the more the slates *cock up*. In the former editions I have reckoned only 2½ ins. as the lap used by some of the best slaters in England. When the slates do not fit closely, the roofs require *rendering* in lime and hair mortar, which costs about 12s per square or 1½d per lineal foot extra.

If 2½ in. lap is sufficient for a Gothic roof of 60 deg., then 3 in. lap should be used for a square roof, 3½ inch for a third pitch, and 4 inch lap for a quarter pitch roof. The *cuttings*, next hips and ridges are generally bedded in mortar.

ASPHALT, FLOORS, PATHS, &C.

Per super. foot.	Melbourne. s. d.	Sydney. s. d.
Pure Seyssel, or rock asphalt, one inch thick, about 90 lbs., including 4 in. foundation of 2 in. bluestone metal..	10 0	13 0
Damp proof course, Seyssel asphalte ½ in. thick	6 0	6 0
Ditto for each extra ⅛ inch thick.. ..	1 6	1 6
Ditto tar and coke dust, ½ inch thick ..	3 0	3 0
Ditto, do. each extra ⅛ inch thick ..	0 9	0 9
Tar concrete or composition pavement, viz., 2½ ins. of 2-inch bluestone, metal foundation, 1 inch coarse, and ½ inch fine screenings, the whole mixed with tar, and dusted over with bluestone dust	1 9	2 9

	Melbourne.	Sydney.
Bluestone (machine broken) metal, 2 in. gauge, p. cu. yard	6 0	12 0
Bluestone 1 inch screenings at Emu Plains per ton		9 0
Ditto, ½ inch, chiefly dust		7 6
Freight by railway to Sydney		5 0
Tar 4d per gallon at Gas Works, delivered		0 6
Tar concrete, 3 ins. of 2 in. sandstone metal, covered with 1 in. coke dust and tar and well rammed, per sup. yd. ..		1 9
Tar concreting footpaths, with gravel foundation covered with coke dust and tar		1 3
Coke dust and tar, mixed for spreading per ton		6 0
Spreading ditto and ramming or rolling, labour only, p. sup. yd.		0 3

N.B.—Tar required for 6-inch tar concrete paving, viz., 3 ins. of 2 in. metal, tarred after spreading, 2 inches smaller metal mixed with tar, topped with 1 inch tar and coke dust requires from 1¼ to 1½ gal. per super yard.

SEYSSEL asphalte is made from a natural calcareous bitumen, found at Seyssel, near Pyrmont, department of l'Aix ; and according to Claridge's specification of his patent, obtained in Nov. 1837, "contains 90 parts of carbonate of lime to about 10 parts of bitumen ;" this is improved by the addition of tar or pitch by the Patentee. The calcareous asphalte rock of Val de Travers, in the Canton of Neufchâtel, in Normandy, contains 20 per cent. of bitumen. Bitumen, naturally combined with calcareous earth, forms a compact slightly elastic substance which is as durable as granite, but no artificial mixture of coal tar and calcareous earth, carbonate of lime, or chalk, has ever been produced at all approaching the natural asphaltes in durability. This is partly due to the difficulty of imitating the natural combination in mixing, but chiefly to the fact of the natural bitumen, being a kind of mineral tar, which will sustain 170 deg. of heat without injury, whereas asphalte made from coal (vegetable) tar, becomes soft at 115 deg. of heat.

Tar and bluestone metal, with tar and bluestone screenings for the top or surface, is sometimes used in Sydney for the whole width of those streets used for steam tramways or light street railways. It is also largely used for cellars and warehouse floors, yards, &c., in Melbourne and Sydney.

AT MELBOURNE TIMBER YARDS.

	Per 100 ft. sup. s.	d.	£	s.	d.
Match boarding, Baltic, Scotch prepared, wrought T. & G., 6 in. x $\frac{1}{2}$ in. ..	12	0	to 0	14	0
Flooring, do,, 6 in. x $\frac{3}{4}$ in. ..	13	0	0	16	0
Ditto, do., 6 in. x $\frac{7}{8}$ in. ..	18	0	1	0	0
Ditto, do., 6 in. x 1$\frac{1}{8}$ in. ..	22	0	1	3	0
Ditto, red do., 6 in. x 1$\frac{1}{8}$ in. ..	21	0	1	5	0
Ditto, pitch pine, 1 in. thick ..	30	0	1	14	0
Ditto, do., 1$\frac{1}{4}$ in. thick do. ..	36	0	2	4	0
Amer. white pine, T. & G., 1 in. thick ..	20	0	1	4	0
Slating battens, 2 x 1, red, per 100 lin. ft	3	3	0	4	3
Ditto, 3 x 1, do. ..	5	6	0	6	3
Weatherboards, Baltic, 7 x $\frac{3}{4}$ in. dressed, ditto	6	0	0	8	0
Ditto, sawn hardwood, 6 x $\frac{3}{4}$ in. ditto	5	0	0	5	6
	p. 100 ft. sup. 1 in thick.				
Baltic red pine, sawn to sizes	24	0	1	10	9
Ditto, deals, 9 x 3, 5d. to 6$\frac{3}{4}$d, and 11 x 3, 7d. to 8$\frac{3}{4}$d.					
Maryborough pine	25	0	1	10	0
Oregon pine, sawn to sizes	14	0	1	0	0
Amer. shelving, wrought face and edge	22	0	1	7	0
Ditto, clear pine, for joinery, &c. ..	34	0	2	2	0
Australian Kauri Pine, sawn to sizes	25	0	1	15	0
Ditto, blue gum or stringy bark, sawn to sizes	12	0	0	16	0
Ditto, do. 3 x 2 to 8 x 3, market cut...	12	0	0	14	0
Ditto, planking..	13	0	0	16	0
Ditto, red gum in scantling	16	0	1	0	0

Per sup. foot.

SASHES, glazed with sheet glass (6 lights each) complete, stock sizes, viz :—	s.	d.
1$\frac{1}{4}$ in. sashes for openings, from 2,4 x 3,9 to 2,10 x 4,10, for 8 x 10 and 10 x 12 panes	0	10
1$\frac{1}{2}$ in. glazed sashes, for frames from 2,10 x 4,6 to 3,4 x 6,6, *in the clear*	0	11

$1\frac{3}{4}$ in. glazed sashes, ditto, for 50 pairs made to order		1	1
Ditto,	12 pairs, ditto	1	2
Ditto,	6 pairs, ditto	1	3
Box frames for ditto, double hung complete, $1\frac{1}{2}$ times the price of the sashes including weights			
2 in. glazed sashes for frames, from 2,10 x 4,6 to 3,4 x 6,6, *in clear, or if 50 pairs made to order*		1	2
Ditto, ditto, for 12 pairs		1	3
Ditto, ditto, for 6 pairs		1	4
Box frames for ditto, double hung complete $1\frac{1}{8}$ times the price of the sashes.			
If the sashes made to order are required without glass, deduct 3d. to 4d. per sup. foot.			
CEDAR (N.S. Wales), $\frac{1}{2}$ in. up to 20 ins. wide		0	7
Ditto, do. $\frac{3}{4}$ in. do.		0	8
Ditto, do. 1 in. do.		0	10
Huon pine (Tasmania), for joinery	from 5d to	0	6

AMERICAN AND COLONIAL DOORS.

Each.

	s.	d.		s.	d.
6,6 x 2,6 x $1\frac{1}{4}$, S.M.	14	0	6,10 x 2,10 x $1\frac{1}{2}$, D.M.	22	0
Ditto, D.M.	15	0	Ditto, $1\frac{3}{4}$, D.M.	24	6
Ditto, $1\frac{3}{8}$, D.M.	17	0	Ditto, 2, D.M.	26	0
Ditto, $1\frac{1}{2}$, D.M.	18	0	7,0 x 3,0 x $1\frac{1}{2}$, D.M...	22	6
6,8 x 2,8 x $1\frac{1}{4}$, D.M.	17	0	Ditto, $1\frac{3}{4}$, D.M...	27	6
Ditto, $1\frac{3}{8}$, D.M.	18	9	Ditto, 2, D.M...	28	0
Ditto, $1\frac{1}{2}$, D.M.	20	0			

N.B.—Doors in bond, about three shillings less than the above.

	From s.	From d.	To. s.	To. d.
SASH DOORS, 6,6 x 2,6 x $1\frac{1}{4}$ to $1\frac{1}{2}$ in. ..	20	0	22	0
Ditto, 6,8 x 2,8 x $1\frac{3}{8}$ or $1\frac{1}{2}$ in. ..	21	0	22	6
Ditto, 6,10 x 2,10 x $1\frac{1}{2}$ or $1\frac{3}{4}$ in.	24	0	25	0
Ditto, 7,0 x 3,0 do. ..	25	0	26	0

	Per 100 lin. ft. £	s.	d.	Per lin. ft. s.	d.
AMERICAN PINE—					
MOULDING, O.G., 1 x $\frac{3}{8}$	0	5	0	0	$0\frac{3}{4}$
Ditto, $1\frac{1}{4}$ x $\frac{1}{2}$	0	6	0	0	$0\frac{3}{4}$
Ditto, $1\frac{1}{2}$ x $\frac{3}{8}$	0	7	0	0	1
Moulding, deal 2 x $\frac{7}{8}$	0	7	0	0	1

	£	s.	d.	s.	d.
Moulding, deal 2½ x ⅞	0	8	0	0	1
Ditto, 3 x ⅞	0	9	0	0	1¼
ARCHITRAVES, 4 x 1 single faced ..	0	12	0	0	1½
Ditto, 5 x 1⅛ ditto	0	15	0	0	2
Ditto, 5 x 1½ double faced	0	18	0	0	2¼
Ditto, 6 x 1¼	1	0	0	0	2½
Ditto, 5 x 1½ single faced	1	0	0	0	2½
Ditto, 6 x 1½ do.	1	2	0	0	2¾
Ditto, 7 x 1½ do.	1	4	0	0	3
Ditto, 7 x 1¾ do.	1	6	0	0	3¼
SKIRTINGS—					
Single faced, 5 x ⅝ moulded	0	11	0	0	1½
Ditto, 6 x ¾ do.	0	12	0	0	1½
Ditto, 7 x ¾ do.	0	14	0	0	1¾
Ditto, 9 x ¾ do.	0	19	0	0	2½
Ditto, 9 x 1 do.	1	3	0	0	3
Double faced, 12 x 1, ...	1	13	0	0	4
Ditto, 15 x 1½, do., built ..	3	0	0	0	7

	£	s.	d.		£	s.	d.
CEDAR MANTLE-PIECES from	1	5	0	to	3	10	0
LATHS, American deal, sawn, 4 ft., per 1000	1	10	0		1	15	0
Ditto, 4 ft. 6 in. do. .. do.	2	0	0		2	10	0
Ditto, Australian sawn, 4 feet do.	1	15	0		1	17	6
Ditto, 4½ ft. do.	1	7	0		1	14	0
Ditto, split Baltic, 4 ft. do.	1	10	0		1	15	0
Ditto, do. 4½ ft. do.	1	13	0		1	18	0
PALING, V.D.L., 5 ft., best paling, per 100	0	15	0		0	17	0
Ditto 6 ft., do. do. do.	1	0	0		1	5	0
Ditto, 5 ft., market or ordinary ..	0	12	0		0	14	0
SHINGLES, Victorian, 28 x 4 per 100	0	6	6		0	7	6
POSTS AND RAILS (one-third or one-fourth posts ... .. per 100	3	8	0				

	s.	d.
SAWING (machine) per 100 sup. ft., ordinary cuts (up to 15 in. deep)	3	0
Ditto ditto frame cutting	5	0

	s.	d.
Sawing circular (machine), for ornamental barge boards, palisading, &c., with outside curves not less than 3 in. diam., at per lin. ft. per in. thick	0	1
If with inner curves or curves less than 3 in. diam, per lin. foot, per inch thick	0	2

N B.—The above prices for circular sawing do not include setting out, &c.

TASMANIAN TIMBER, &c.

Per 100 *sup. feet. reduced.*

	Hobart. £	s.	d.	Launceston. £	s.	d.
Hardwood market scantlings up to 6 x 3 and not more than 16 ft. long per cargo, 6s., retail ..	0	8	0	0	10	0
Girders or beams, any length, 16s. to...	1	0	0	1	0	0
Blackwood in logs	0	16	0	0	14	0
Ditto, scantlings	1	10	0	1	5	0
Hardwood 3 x 1 battens (4 to a ft.)	0	10	0	0	12	0
Ditto flooring, rough 5 x 1 6 x 1, and 7 x 1	0	10	0	0	12	0
Ditto, flooring, dry stacked 3 to 6 months	0	14	0			
Ditto, ditto T. and G. wrought one face	0	18	0	1	0	0
Ditto, weatherboards 7 x $\frac{3}{4}$ rounded and chamfered ..	0	16	0	0	18	0
Kauri and Baltic, ditto ditto ..	1	7	0	1	8	0
Oregon cut to scantlings ..				1	5	0
American redwood ditto ..				2	0	0
Cedar 1 in. = 1s. $\frac{3}{4}$ inch 9d. per sup. ft.						
Shingles hardwood per 1000 ..	0	14	0	0	16	0
Palings split, stringy bark, 5 ft. x 7 x $\frac{3}{8}$ per 100	0	10	0	0	14	0
Ditto ditto, 6 ft. common	0	9	0	0	10	0
Laths, hardwood split, 3 feet per 1000				0	12	6
Baltic deals 9 x 3 per lineal foot	0	0	$4\frac{1}{2}$	0	0	$4\frac{1}{2}$

	Hobart. £	s.	d.
Piles, blue gum, 20 in. to 12 in. diam .. per lin. foot	0	2	0
Railway sleepers ditto, sawn per 100 sup. feet	0	7	0
Piles stringy bark 12 ins. at butt, ditto ..	0	0	7
Posts split 7 to 8 ft. average 6 x 3 per 100 ..	1	10	0
Rails ditto 9 ft. average 5 x 2 per 100 ..	1	6	0

N.B.—JOINERY similar to Melbourne prices.

RAILWAY SLEEPERS,

The best sleepers are those made from seasoned blue or red gum, ironbark, blackwood, or box. The trees should be barked and allowed to die before they are felled, by which means they become partly seasoned; the season for falling Australian timber is from March to September, when the sap falls; it should then be split or sawn and stacked in the shade in such a manner that it may be well ventilated; but with every precaution, the ends will open more or less; this may be partly stayed by bolting them. It would be worse than useless to tar *unseasoned timber*, which would only hasten its decay by preventing the sap evaporating.

COST OF SLEEPERS.

8 *ft.* x 9 *in.* x 4½ *in. each.*	s	d.
Falling, barking, and trimming trees	0	6
Removing logs to saw pits, within half-a-mile ..	0	3
Squaring and preparing timber for sawyers, and sawing complete	0	9
Removing from pit and stacking	0	3
Cost price per sleeper near pit as above	1	9
Loading, cartage, and unloading, for first mile	0	6
Add for each additional mile	0	2
Boring sleeper, 9 inches wide, at both ends ..	0	3½
Riveting sleeper, with ½ in. iron rivets	0	2½
Removing from heap and re-stacking	0	3

To which must be added the cost of the 2 iron rivets and washers about 1½ lbs, and profit on the whole.

Adzing sleepers for permanent way, per 100 ..	15	0	

Sawn Sided are far superior to the half round sleepers, because very young timber is always inferior to that which has arrived at maturity, as it contains a large proportion of heart and *white* or outside, which is never sound; and although sufficient of the *white* is adzed away to bed the chair, the remainder soon rots, thereby destroying the sleeper and loosening the ballast surrounding it.

In choosing trees for sawn timber, posts, slabs, &c, avoid those with dead branches, which are often an indication of decay when the trees otherwise appear sound. The best wood is always found in full-grown trees, upon dry soils or slopes.

In Splitting ironbark, the slabs, posts, &c., are split parallel with the *rings*, and generally thin out towards the top, but in stringy bark the slabs are generally split in radiating lines from the centre outwards, and in this manner have been split 2 feet wide by 5 feet long.

Splitting and Fencing.

Posts, Rails, and Slabs, per 100.

	Labour only s.	d.
Falling, sawing, and splitting iron bark slabs, 5½ ft. x 11 ins. x 1½ inch	10	0
Ditto, stringy bark slabs, do.	7	0
Ditto, do. 3½ ft. x 11 ins. x 1½ ins.	5	0
Ditto, iron bark do.	7	0
Ditto, stringy bark, box or gum posts, 7ft. by 9 in. x 4 ins., and rails 9 ft. by 6 ins. x 3 ins. viz. 25 posts and 75 rails	20	0
Falling, sawing, and splitting hardwood posts and rails (as per last item) for 3 rail fencing, at per rod	1	8
Fencing, *per rod, labour only.*		
Mortising posts, adzing rails, sinking holes, and putting up 3-rail fence complete	3	0
Nailing 5 feet narrow *spaced* paling on do.	0	6
Ditto, wide close paling, 6 nails each, on do. ..	1	0

Rough Timber Bridges.

Hardwood, per cube foot.

	s.	d.
Falling, trimming, and barking gum or box, for piles, bearers, struts, &c., from 15 to 18 inches, diam., and from 20 to 40 feet long	0	6
Rough adzing and squaring ditto	0	6
Piling in clay, sand, loose gravel, &c.	1	6
Hoisting, framing, fixing, bolting, &c.	1	0
Sawn planking, railings, guard rails, &c., fixed and bolted, complete	3	9
Wrought hand-rails, &c., framed and fixed, complete	5	0
Add bolts, straps, &c., per lb.		

	s.	d.
Cartage of hardwood per cubic foot, including loading and unloading for first mile	0	3
Ditto for every additional mile	0	1
Cartage of 25 posts and 75 rails (scantling as above, weighing 3 tons) for first mile, including loading and unloading by bullock team	4	6
Ditto, for each additional mile	1	0

RAILWAY BUFFER FRAMES.

	s.	d.
Hardwood curbing, uprights, heads, sills, struts, sleepers, &c., framed, housed and bolted, labour only at per cu. ft.	2	0

Ironwork to be charged by the pound.

RAILWAY GATES, N. S. WALES.

For level crossings per cube foot.

	s.	d.
Hardwood wrought in posts, struts, guard rail, &c.	7	0
10 or 12 feet gates, Baltic deal, wrought, framed, tapered and stop chamfered	12	0
10 feet gates, including hardwood, deal, ironwork, painting and hanging complete, about £40	0	0
12 feet gates, ditto ditto ditto £47	0	0

TIMBER, BRIDGES, PILING, &C.

Including Hardwood at 2s. p. cu. foot.

First class per cubic foot.

	s.	d.
Hardwood round piles (vertical) from 20 to 40 feet long, driven complete, lin. ft. = 1 cube foot ..	3	6
Ditto, raking ditto, or vertical sheet piling ..	4	6
If in shallow water, or if more than 40 ft. long add	1	0
Labour in pile driving, including staging, &c., from 1s 6d. to	2	0
Hardwood sawn sided, bolted and fixed in walings, braces, collars, struts, straining pieces, corbels, girders or joists	4	6
Hardwood, wrought, framed, and chamfered in stanchions, sills, diagonal braces, hand-rails, &c.	6	0
Hardwood, rough wrought and splayed, in guards, fenders, &c.	5	0

	s.	d.
Hardwood 3 inch planking in roadway, &c., laid and spiked	3	6
Ditto, 2 inch do. in footways, &c. do. ..	4	0
For Ironbark at Sydney add per cu. foot	0	6

The above items include the fixing only of all ironwork, in piles, &c.; also hardwood within 2 miles.

Laminated bridge of 70 feet span and 16 feet wide, 4 arched ribs each, with four 10 x 4 planks on raking piles, &c., for springing, cost about £5 per lin. foot, and large strutted bridges about £8 per lin. foot complete.

CARPENTERS' WORK.

N.B.—The whole of the prices given in Carpentery and Joinery are for hand labour at 15d. per hour to deal or pine, unless otherwise mentioned.

DEAL OR PINE IN SCANTLINGS.

Labour only, at 15d. per hour.

	Per cu. ft. s.	d.	Per 100 s. ft s.	d.
Beams, breast-summers, wall-plates, pole-plates, lintels, templates, wood-bricks, sleepers, &c.	0	7½	4	10
Framing, rough, ordinary scantlings ..	1	1	9	0
Ditto, wrought	1	7	13	0
Ditto, do., and stop chamfered	1	9	14	6
Ditto, do., and rebated	2	0	16	8
Ditto, do., do., and beaded ..	2	2	18	0
Wrought rebated and beaded door and window frames with sunk and weathered hardwood sills	3	0	25	0
JOISTS, ground, ceiling-floor,, or ceiling joists, notched or housed and spiked ..	0	10	7	0
Ditto, framed to binding joists, girders, &c	1	0	8	4
Ditto, single-framed floors, trimmed to well holes, chimneys, &c.	1	1	9	0
Add for each storey above ground floor ..	0	1	0	8
Partitions, 3 in. x 2 in., framed	1	3	10	6
Ditto, 4 or 5 x 3	1	0	8	6
If braced, add for each side	0	1	0	8
Ditto, trussed with king posts, add ..	0	3	2	0
Ditto, with king and queen add ..	0	4	2	9

N.B.—If in hardwood add from 10 to 20 per cent.

	Per cu. ft. s.	d.	Per 100 s. ft. s.	d.
GANTRY for travelling crane, braced, strutted and bolted together, not more than 30 feet high (Oregon pine)	1	3	10	5
Add for every 10 feet extra height ..	0	1	0	8

Travelling crane (Oregon) trussed with iron tie rods, bars, &c., about double these prices, including hoisting.

Labour in fixing and hoisting ironwork, including wheels and axles to do. per lb., 1d.

The bolts, dog-irons, &c., will not exceed 1 lb. per cubic foot.

The Oregon will sell for about one-half. If red pine or deals are used for braces, they might be used for the joinery of finishing trades when the gantry is removed.

ROOFING.

Labour at 15d per hour and nails.

	Per cu. ft. s.	d.	Per 100. s.	d.
Single span or valley roof over ground floor	1	2	9	0
Ditto, for every extra floor, add	0	1	0	8
Girders, binders, struts, angle ties, and curb roofing, with pole-plates, and rafters	1	1	9	0
King truss roof, with purlins, &c.	1	6	12	6
Queen truss roof, from 30 to 45 feet span, with purlins, &c., over ground floor ..	1	8	14	0
Framed roofing, from 45 to 60 feet span with principals, king, queen, and prince posts, struts, and purlins, over ground floors	2	0	16	8
Ditto, if higher, add per storey	0	1	0	8
Fixing screw, king or hanging bolts, stirrups, ties, straps, &c., per lb.	0	2	8	4

Laminated semi-circular roof trusses, wrought all sides, painted before put together and nailed in thicknesses is worth from 50 to 70 per cent. more than for similar solid framing.

Laminated semi-oval roof trusses similarly treated from 70 to 100 per cent. more than for solid framing.

Equilateral Gothic Oregon truss, 43 feet span, principals 12 x 6; tie beams, 10 x 5, with hammer beams, wrought below collar ties, stop chamfered and fitted; cost price per truss, about £6. Raising the above with 4 men, derrick, &c., about 15s.

HARDWOOD.—Add from 15 to 25 p. cent. on the roof items for extra labour. The Australian hardwoods are generally worked before they are even half seasoned, hence the slightly increased cost of working them, as compared to deal, and the cracked ceilings and sunken floors of some of the buildings in Sydney. In Melbourne hardwood is seldom used in first-class buildings for these reasons.

BRACKETING, *including plugging.*

Labour and nails, per foot super.

	s.	d.
Common cornices or coves 1½ inch deal, measuring where lathed	0	5
Wagon headed ceilings, passages, &c., measuring where lathed	0	3
Groined ceilings in halls ditto	0	9
GUTTERS, inch and 1¼ inch deal and bearers ..	0	5
Ditto, to curb roof, add	0	2
Ditto, if curved on plan, add from 2d to	0	4
CENTERING for brick trimmers, or gauged arches, or culverts	0	5
Ditto, small groined arches	0	10
Common centering on 3 in. ribs, with inch battens for vaults and large culverts	0	4
Heavy centering for arches, 15 to 30 feet span ..	0	7
Centering for concentric segmental (circular circular) arches of brickwork or coke concrete, 16 to 20 feet span springing from circular iron girders on piers for covered reservoirs, &c., the centering being formed on trussed ribs (radiating in plan) from 3 to 5 feet apart, and covered with colonial pine laggings 1½ x 1½ per sup. foot	0	9

N.B.—If the cost of centering is included in the price of brickwork, stonework, &c., the arches, &c., should be taken separately, or the openings not deducted. If the same centre is used for more than one opening, the setting and striking only should be reckoned and one-third the cost of the centre.

WEATHER-BOARDING.

Per square fixed.

	Labour. s	d.
Deals, Rough, ¾ inch, or 6 boards to a 3 inch deal	5	0
Ditto, wrought..	12	0
Ditto, do., and beaded	14	0

If machine wrought, reckon first item only.

	Materials s.	d.	Labour s.	d.
Deal battening 2 x 1 for Ladies slates ..	8	4	1	8
Ditto for Countess or Viscountess slates ..	6	6	1	6
Ditto for Duchess, or short Duchess ..	4	9	1	3
Hardwood do. for shingles, 15 ins. x 3½ 210 l. ft. of battens, 3 x 1	10	0	0	8
Hardwood do. for half 5 feet palings, 100 l. ft. do.	5	0	0	6
Ditto for half 6 ft. palings, 80 l. ft. do. ..	4	0	0	6
If more than two stories high, add p. story			0	2
SHINGLING, shingles 15 x 3½, £1 5s. to	30	0	9	0
Shingling with Amer. sawn red pine shingles, 30" x 6" x ⅜, including hardwood battens	30	0		
Paling roof, half (5 ft.) palings, 4" x ½ ..	27	6	5	0
Ditto, half (6 feet) palings..	28	0	4	6

Shingles and half palings are each secured with only one nail.

A square requires 830 shingles for 6-inch, and 1,000 for 5-inch gauge, or 100 5-feet, or 90 six feet palings.

The slating battens are generally put on roof by the slater.

SUNDRIES.

Picket hardwood fencing, posts 8,0 x 5 x 5, with moulded caps; arris rails, 4 x 4; ornamental pickets, 4 ft. 6 ins. x 3 x 1, per lineal foot, materials 1s. and labour 1s.		2	0
2 rail, 6 feet split paling fence with split posts and rails at £5 per 100 per lineal foot		1	6
Fillets and rough boarding for pugging per square		40	0
Planing fir clean from the saw p. ft. super. ..		0	1
Ditto, if old saw cut do.		0	1½
Fixing door-frames in new walls, each		2	0
Door and casement frames, beaded and rebated hardwood with moulded deal transomes, per lineal foot, all materials		0	9
Herring bone trussing, do. do. ..		0	6
Ridge and hip roll, do. do. ..		0	4
Rebated laps for lead gutters	each	0	7
Cesspools for mud in gutters	do.	2	0
Fixing lining to ceilings, laying floors or fixing weather-boarding, labour and nails per square from	4s. 6d. to	5	6

Planed extending light Trellis work in sizes from 21 to 66 sup. feet, but folded together for convenience of packing into parcels, 2,0 x 2,6 up to 2,6 x 7,0 ; they are made from picked Baltic deal and are imported by the Agents at per sup foot 0 4

MEASUREMENT.—To the full length of the timbers add the length of tenons, dovetails, scarfs, and all other waste in conversion ; no timber should be cubed of less than 9 superficial inches in sectional area, and then only for engineering works.

In all superficial work such as floors, ceilings, partitions, walls, &c., for "Labour and Nails," or "Labour only," take the full dimensions, including well-holes, chimney breasts, doorways, windows, &c , which are not to be deducted, except the opening exceeds 36 superficial feet, when one-half the area only is allowed.

King and queen posts should be taken full size without deduction for waist or waste in cubing or squaring.

TIMBER *at Sydney.*

These prices are subject to fluctuations, according to the supply and demand, and should not be depended on for large quantities.

ROUND PILES, 12 to 15 in. diam., delivered at the Sydney wharves, 1s. 2d. per lineal foot.

HARDWOOD in scantling, cut to order, per 100 ft., 15s. to 17s.

Ditto, 4 x 2½, 10s. ; 5 x 2½, 14s. ; 6 x 2½, 15s. p. 100 l. ft.

Ditto, 3 x 1 battens, 4s. ; 2½ x 1 battens, 3s ; 3 x 2, 7s.

COLONIAL PINE, 3 x 2, 8s ; battens, 3 x 1, 4s per 100 l. ft. ; 1 in. boards, 18s. ; ½ in. boards, 14s. per 100 sup. ft. ; boards dressed one side, extra 2s. ; two sides, extra, 3s.

BALTIC DEALS, 11 x 3, 9d ; 9 x 3, 7d. ; battens, 3 x 1, 5s. ; battens 2¼ x 1, 4s ; dressed deal weatherboards, 12s. 6d. per 100 l. ft.

IRONBARK sawn in bulk or scantling, 2s ; ditto, adzed square, 1s. 8d. per cube foot.

OREGON PINE spars, plank, or baulk as imported, p. 100 ft. sup., 14s. ; ditto, cut to scantlings, 15s. to 16s.

TALLOW WOOD in scantlings for joinery or frames, 18s. p. 100 sup. feet.

REDWOOD, Amer., ½ in , 18s ; 1 in., 23s. ; scantlings, 24s. per 100 sup. ft.

PITCH PINE planks 3, 4 and 6 ins. thick, 20s. per 100 sup. feet.

CLEAR PINE, Amer., 1¼ to 2 in. thick, 36s. p. 100 sup. ft ; dressed shelving, 12 ins. wide, 25s. do.

KAURI PINE boards, 9 x 1 and 12 x 1, 20s., from 14 to 18 ins. wide 22s per 100 sup. ft.

CEDAR, p. sup. ft. ½ inch, 4½d; ¾ inch 5½d.; 1 inch, 7d.; 1¼ inch, 8d.; 1½ inch, 9d.; 1¾ inch, 10d.; 2 inch, 1s; 20 to 24 inches wide, 1d., above 25 inches, 2d. per ft. extra.

SHINGLES, best oak, 15 x 3½. from 30s. to 40s. per 1000.

LATHS, split hardwood, 3 feet, 15s.; 3½ feet, 19s.; Amer. laths, 4½ ft. 28s per 1000.

PALINGS, best extra box. 5 feet, 16s.; 6 feet, 19s. per 100.

N.B.—See monthly Price Lists for more definite information.

JAMB LININGS AND ARCHITRAVES.

Machine made per set of 17. *lin. ft.*	Pine s.	Pine d.	Cedar s	Cedar d.
6 inch x 1⅜ inch double rebated	9	0	17	0
10½ inch x 1⅜ inch do.	13	0	27	0
16 inch x 1⅜ inch do.	19	0	38	0
If single rebated, 1s per set less.				
Architraves 4 inch for one side per set ..	4	0	8	0
Ditto 5 inch sin. faced	4	6	9	0
Ditto 6 inch ditto	5	0	10	0

N.B.—See monthly Price Lists for more definite information.

FLOORING AND LINING.

Machine dressed, per square.

LAID OR FIXED COMPLETE at 15d per hour.	1¼ inch. s.	1¼ inch. d.	1 inch. s.	1 inch. d.	¾ inch. s.	¾ inch. d.	½ inch. s.	½ inch. d.
Hardwood (tallow wood) wrought, 1 side T. and G. ...	33	0	28	0				
Kauri pine ditto ..	38	0	32	0				
Colonial pine ditto ...	36	0	30	0	28	0	26	0
Maryborough pine ditto ...	38	0	32	0	30	0	28	0
Oregon pine ditto ...	30	0	25	0				
Baltic red pine, 6 ins. wide, do.			32	0	27	0	25	0
Pitch pine 5 ins. wide ...	38	0	34	0				

	Materia's. s.	Materia's. d.	Labour, s.	Labour, d.
Ventilator for gable, 3 ft., sides equilateral triangle, with 4 x 2½ hardwood frame fixed in 4½ inch reveals and filled with 6 x 1 Louvre boards, all clean wrought	4	0	18	0
Ventilator (2nd rate), for side of roof, 3 feet equilateral triangle, and 4 ft. ridge-roll frame 2 x 1½ nailed together, and filled with 3½ x ¾ Louvre, sides covered with redwood T. and G. flooring	4	0	16	0
Ventilator for church ceiling, 3',4" diam. 1¼ in. pine, cut with 4 trefoils and centre quatrefoil openings, 3 in. bold moulding planted round edge in segments fixed complete	10	6	18	0

CHURCH PEWS (PINE).

Front of pews, 8 ft. x 2',9" x 1½ in. stiles muntins and rails stop chamfered on face, also 6 diagonal V grooved 1 in. panels, flush and chamfered at back per foot super	0	6	1	0
Pew backs, 8 ft. x 20 ins. x 1½ in. face stop chamfered, three 1 in. bead and flush panels, per foot super	0	6	0	11
Seat for ditto, 8 ft. x 12 ins. x 1½ in., with rounded edge, supported at ends and by 2 seats, per foot run	0	6	0	6
Pews backs open, as before, without panels..	0	5	0	10
Church pews complete, 9 feet long, similar to the above with stall ends (curved tops and carved number, 3',2½ x 15½ ins. x 3 ins. fixed on soles, 17 x 4 x 4, secured to floor, backs, seat, &c., as before	30	0	50	0

GOTHIC DOORS and Windows are often mill made, the price being similar to circular headed doors, &c.; if hand made they cost abou 50 per cent more than if square headed.

PULPITS, READING DESKS, and ROSTRUMS are too varied in design to give any definite prices; the rough framing, panelling, cornice and other mouldings, carving, &c., may be obtained from items under these headings. See index.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
Deal cased frames, hardwood sunk sills for 1½ inch sashes, brass-cased pullies prepared to hang double	0	6	0	8
2 inch ditto, prepared to hang double ..	0	7	0	9
2½ inch sashes, &c. ditto	0	8	0	10
If in cedar add 60 per cent.				
VENETIAN deal-cased frames, &c., for 1½ inch sashes, prepared to hang double across side lights	0	6	0	9
2 inch ditto,, prepared to hang double ..	0	7	0	10
2½ inch sashes ditto	0	8	0	11
Framing and fitting frames complete from the bench. each			3	0
Ditto, Venetian, ditto			4	0
N.B.—Stone or brick opening for measurement. If in cedar add 60 per cent.				

FRENCH CASEMENT FRAMES, &C.

Per super foot.	Materials. s.	d.	Labour fixed s.	d.
Hardwood, wrought, rebated and beaded or stop chamfered frames 5 x 3 with sunk sill and water bar for 2 inch casement	0	4	0	6
Ditto, with moulded transome, ditto..	0	5	0	7
Ditto, do., prepared for circular fanlight..	0	6	0	8
Ditto with cir. fanlight square inside ..	0	8	0	10
For French casements see Table of doors, &c., page 79.				
DOOR FRAME, 5 x 4 hardwood for entrance hall, with moulded transomes prepared for fanlight and side lights	0	5	0	8
			s.	d.
Door frame only 5 x 3, mill made (not fixed) each			13	6
Ditto, do. do. with transome do.			16	6
Ditto, do. do. prepared for circular fanlight			30	0
Ditto for side and fanlights			46	0
Sunk hardwood sill to 4 last items, add			3	0

SHOP FRONTS, OR FIXED SASHES.

Small squares, per foot super.

	Materials. s.	d.	Labour fixed. s.	d.
1½ inch deal ovolo or other moulding ..	0	2	0	6
2 inch deal ovolo do. ..	0	3	0	7
2½ inch deal ovolo do. ..	0	4	0	8

For cedar add 80 per cent. for material, and 1d. per foot extra for labour.

SASH BARS.

Per lineal foot, machine wrought.

	s.	d.
3 inch, lamb's tongue or ovolo, fitted and fixed ..	0	7
2 inch do do ..	0	5
1¼ inch do do ..	0	3

If hand-made add one-fourth ; if in cedar double the price.

SASHES AND FRAMES.

Not glazed, per foot super.	Materials. s	d.	Labour fixed. s.	d.
Deal-cased frames, *hardwood* sunk sills, 1½ in moulded sashes, double hung, brass-cased pullies, patent lines and iron weights	0	10	1	4
Deal-cased frames *hardwood* sunk sills, 2 inch moulded sashes, double hung, brass cased pullies, &c., as above	0	11	1	5
Deal-cased frames, double hung, with 2½ inch sashes, &c., as before	1	0	1	6
Ditto, with semi-circular head and span-drills, to show square inside	1	0	2	0
Ventilator (small), frame 2 x 1½, blades 2 x ½, 3 inches apart	0	6	3	6
VENETIAN deal-cased frames, *hardwood* sunk sills, 1½ inch moulded sashes, double hung, &c., as above	1	0	1	4
Ditto, with 2 inch sashes, ditto	1	1	1	6
Ditto, with 2½ inch sashes, ditto	1	2	1	9

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1½ inch deal moulded or bevelled bars..	0	2½	0	7½
Ditto with cross-bars	0	3	0	9
2 inch deal moulded or bevelled bars ..	0	3	0	8
Ditto with cross-bars	0	3½	0	8½
For every ½ inch extra thickness, add ..	0	0½	0	1
FAN-LIGHT, 1½ inch deal, one light ..	0	3	0	6
2 inch deal, do. ..	0	4	0	7
2½ inch deal, do. ..	0	5	0	8

WINDOW LININGS, ELBOWS, AND SOFFITS.

Per foot super.	Materials. s.	d.	Labour. s.	d.
Inch, or 1¼ inch deal, 2 panel square, framed, back linings, elbows or soffits	0	5	1	0
Bead butt, or moulded, add		..	0	2
Bead flush, or quirk moulded, add ..		..	0	3
Each panel above 2, if square, add ..		..	0	2
Ditto, if moulded add ..		..	0	3

WINDOW BOXINGS.

Per foot super.	Materials s.	d.	Labour fixed. s.	d.
1¼ inch deal, framed, rebated and beaded	0	5	1	2
Inch and 1¼ inch, ditto, splayed	0	5	1	3
Inch and 1¼ inch boxings for sliding shutter, or sashes, double hung including grooves, beads, fillets, &c. ..	0	5	1	6

INSIDE SHUTTERS

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
¾ inch and inch deal, rebated, and beaded or clamped in one height	0	4	1	0
Inch and 1¼ inch deal, 2 panel, square framed	0	5	1	0
Bead butt and square	0	5	1	1
Moulded or bead flush and square ..	0	5	1	2
Moulded and bead butt	0	5	1	3
Moulded and bead flush	0	5	1	4
For every extra panel, add	0	0	0	2

If under 9 inches wide, add one-fourth to labour only.

WOOD CARVING.—The cost of carving in cedar is almost the same as in Sydney freestone, as per pages 43 and 44.

Carving in Blackwood the same as for Spring Bay stone.

Clear Pine Carving about the same as for Oamaru freestone.

COLOUR.—The lighter the colour of the ornament, or enrichment the more readily is any defect observed. For this reason a Corinthian capital which might be passable if carved in cedar or blackwood, would look coarser in clear pine, and would be scarcely passable in plaster of Paris.

SHUTTERS FOR SHOP FRONTS, &c.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1¼ inch deal, 2 or 3 panels high, square framed	0	5	1	0
Bead butt and square	0	5	1	1
Moulded or bead flush and square ..	0	5	1	2
Bead flush and bead butt	0	5	1	3
For every extra panel in height	0	0	0	1
Ditto, ¼ inch thick, add	0	1	0	1
1¾ inch large size shutters, hung for bar windows, &c.	0	9	1	3
Ditto for circular head openings	1	0	2	0
2½ inch moulded stallboard	0	9	1	6
Grooves to inclose shutters, per foot run ..	0	2	0	9
Fixing iron shoes, per pair	0	0	1	0

VENETIAN SHUTTERS.

Per foot super.

1½ inch Venetian or Louvre shutters, secured to box frames	0	8	1	4
1¾ inch do. do. ..	0	9		5

For Circular work, see Rules, page 85.

All fastenings, iron shoes, parliament hinges, &c., extra

FRAMED GROUNDS.

Per foot super.	Materials. s.	d	Labour fixed. s.	d.
Inch deal framed grounds	0	4	0	7
If 1¼ inch deal, add	0	1	0	1
1 inch skeleton grounds, for pilasters, &c.	0	4	0	6
1¼ inch ditto ditto	0	5	0	7
1½ inch ditto ditto	0	6	0	8

DOOR LININGS

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1¼ inch deal, single rebated	0	5	0	7
1¼ inch square framed 2 panel jambs, and 1 panel head, single rebated ..	0	5	1	0
Ditto, bead butt, bead flush or moulded..	0	5	1	1
Ditto, reed flush, or raised moulded ..	0	5	1	2
For extra panel or double rebated, add ..	0	0	0	1
If 1½ inch, add	0	1	0	1

EXAMPLE.—Required the cost of 1½ inch deal double rebated door linings upon inch deal framed grounds.

Item 1 of framed grounds, and item 1 and 5 of door linings, viz :—

	s.	d.
Materials, Grounds, 4d. ; Linings, 5d.	0	9
Labour, do. 7d. ; do. 8d.	1	3
Cost price per sup. foot	2	0

GATES AND COACH-HOUSE DOORS.

Per foot super.	Materials. s.	d	Labour only. s.	d.
2 inch deal, framed and braced, filled in with inch deal, tongued and beaded ..	0	8	1	0
2½ inch ditto, with 1½ inch framed rails and braces, filled in with inch deal, rebated and beaded	0	10	1	2
2 inch deal, pallisade gates, lower part bead butt, or bead flush and square, upper part 1¼ inch pallisades	0	7	1	1
2½ inch ditto, do...	0	9	1	3
2 inch deal, 6 panel gates, bead butt or bead flush and square	0	9	1	8
2½ inch ditto do.	0	10	1	10
For two extra panels, add	0	0	0	2
If bead butt or bead flush back, add ..	0	0	0	2
If 3 inch deal gates, add on the 2½ inch ..	0	2	0	2
If framed with a wicket, add	0	1	0	2

Hinges and other ironmongery to be charged extra.

DEAL PANELLED AND OTHER DOORS.—*All Materials, per foot super.*

Materials reckoned at 4d. per sup. foot and Joiners' wages at 15d. per hour.	1 inch. s. d.	1¼ inch. s. d.	1½ inch. s. d.	1¾ inch. s. d.	2 inch. s. d.	2½ inch. s. d.
Ledged doors, traps and flaps, T. G. and beaded ...	0 9	0 10	0 11	.....	.....	.....
Ledged and braced, or folding, or in 2 heights ...	0 10	0 11	1 0	.....	.....	.....
Dwarf doors, 1 panel moulded and square, including framed fronts...	1 2	1 3	1 4	.....	.....	.....
Skeleton doors, 4 panels flush for covering	.....	1 2	1 4	1 6	1 8	.....
Closet doors, 2 or 3 panel square	1 1	1 2	1 3	.....	.....	.....
Ditto, four panel moulded and square	1 3	1 4	1 5	.....	.....	.....
4 panel doors, framed and ledged	.....	1 3	1 4	1 6	1 8	2 0
Ditto, bead butt, or moulded and square ...	.....	1 4	1 5	1 7	1 9	2 1
Ditto, double moulded	.....	1 5	1 6	1 8	1 10	2 2
Ditto, folding doors with raised panels	.....	.....	1 9	1 11	2 1	2 4
Ditto, bolection or raised moulded	.....	1 6	1 7	1 9	1 11	2 2
If 6 panel doors, add to 4 panel doors	.....	.....	0 2	0 2	0 2	0 2
If 8 panel door ditto	.....	.....	.....	0 4	0 4	0 4
8 panel folding doors with raised moulding	.....	.....	2 0	2 3	2 6	2 9
6 panel doors, raised panel and raised mouldings ...	.....	.....	2 0	2 3	2 6	2 9
Sash doors, 4 or 6 lights, lower panel moulded (glazed)	.....	.....	1 3	1 4	1 6	.....
Sash doors with raised mouldings, upper panel fluted plate glass (1 light)	.....	.....	.....	2 0	2 2	2 4
Sash doors, raised mouldings and margin lights (glazed)	.....	.....	1 8	1 10	2 0	2 2
French casements, moulded and glazed	.....	.....	1 6	1 8	1 10	2 0
French casements, raised mouldings (glazed)... ...	.....	.....	1 10	2 0	2 2	2 4
Ditto, ditto, and circular glass ...	.....	.....	2 0	2 2	2 4	2 6
Ditto, raised panel, moulded and circular glass ...	.....	.....	2 2	2 4	2 6	2 8

WAINSCOTTING OR PANELLING.

Per foot super.	Materials only. s. d.	Labour fixed. s. d.
Inch deal, square framed up to ceiling ..	0 4	0 5
1¼ inch ditto..	0 5	0 6
Ditto, moulded, bead butt or bead flush ..	0 6	0 7
1 inch, dwarf square framed	0 4	0 6
1¼ inch ditto..	0 5	0 7
Ditto, moulded, bead butt or bead flush ..	0 5	0 8
If two panels high, or raking to stairs, add..	0 1	0 2
If raised moulded, add	0 1	0 2

Mock panelling about 60 per cent., or ⅝ for labour.
For cedar or circular work, see page 85.

COST OF CEDAR DOOR.

	£	s.	d.
4 panel double, raised moulded door, 7·0 x 3·0 x 1¾ in. as per Table p 79. 21 sup ft. at 1s. 9d	1	6	9
Add 100 per cent. for cost in cedar as per p. 85.	1	6	9
Price, without furniture, varnishing, or hanging	2	13	6

PARTITIONS.

Per foot super.	Materials only. s. d	Labour fixed. s. d.
1 inch machine wrought T. & G. vertical flooring boards (6 x 1) with centre ledge and grooved 3 x 2 head rail, next ceiling, secured at foot with 6 inch torus skirting	0 4½	0 1½
1½ inch panelled partition, single moulded	0 6	1 0
Ditto, moulded both sides	0 6	1 1
2 inch, square-framed partition	0 8	1 1
Ditto, bead butt, or moulded and square	0 8	1 2
Ditto, moulded both sides	0 8	1 3
If raised moulded add	0 0	0 1

COUNTERS.

Per foot super.	Materials only. s. d.	Labour fixed. s. d.
1 inch deal top, glued and blocked ..	0 5	0 6
1¼ inch, ditto, do.	0 6	0 7
1¼ inch deal fronts, framed square ..	0 5	0 6
Ditto do. moulded ..	0 5	0 7

	Materials. s.	Materials. d.	Labour fixed. s.	Labour fixed. d.
Morticed clamps, per foot run	0	1½	0	6
Tongued heading joints, per foot run ..	0	1½	0	4½
Mitres to clamps, each	0	0	0	8
Fitting and hanging flaps, each, ...	0	0	1	0

WATER CLOSETS.

Per foot super.

1¼ inch deal seat, 1 in. riser, and bearer	0	5	0	8
Ditto, framed and bead top, with mortice clamped flap	0	5	0	11
1 inch deal, bead flush, framed front ..	0	5	0	9
Moulded nosing, per foot run	0	1	0	2
Cutting and dishing holes in deal, each	0	0	1	3
Ditto, for pull, including beads, do. ..	0	3	2	0

For cedar or for circular work, see Rules, page 84.

STAIRCASES.

Complete, per story.

	£.	s.	d.		£.	s.	d.
Common stairs, close strings, 1 flight	3	0	0	to	4	0	0
Dog leg stairs, open strings ..	6	0	0		8	0	0
Stairs with open strings, return nosings, continued handrail, steps about 3½ feet long, 12ft rooms	18	6	0		20	0	0
Geometrical stairs with single rail, steps about 5 feet long, ditto ..	26	0	0		32	0	0
Ditto, ditto per step..	1	5	0		1	12	0

STAIRCASES.

Per foot super.

	Materials only. s.	Materials only. d.	Labour fixed. s.	Labour fixed. d.
Inch deal wrought steps, risers, and two carriages..	0	6	0	8
1¼ inch wrought deal steps, risers, and two carriages	0	7	0	8
Ditto, glued and blocked, with moulded nosings	0	8	0	11
Ditto, mitred to cut string and dove-tailed for balusters	0	8	1	2
Ditto, do. bracketed	0	8	2	4
1¼ square framed spandrels	0	6	0	10
Ditto moulded or bead butt	0	7	1	0

Items, each.	Materials. s.	d	Labour. s.	d.
Quarter curtail step glued upright ..	1	9	6	3
Proper curtail step and riser	3	0	30	0
Returned moulded and mitred nosings ..	0	3	2	6
Ditto, circular	0	4	4	0
Plain cut brackets..	0	4	2	6
Housings to wall string for step and riser	0	0	0	6
Ditto to winders with moulded nosings..	0	0	1	6
Notching outer string, per step	0	0	0	6

STRING BOARDS.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1¼ inch plain wall string	0	5	0	9
1½ inch ditto ditto	0	6	0	10
2 inch ditto ditto	0	8	1	0
If moulded, add..	0	1	0	2
1¼ inch deal, plain outside string, rebated, beaded and framed to newels	0	5	1	0
Ditto sunk and beaded, or moulded ..	0	5	1	2
Ditto, and mitred to risers	0	5	1	3

Writhed strings, or facia, 4 times the price of straight for labour and twice for material. For cedar and circular work, *see* page 85.

HAND RAILS, BALUSTERS, NEWELS, &C.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
Cedar oval 4-inch handrail sunk for balusters	0	6	1	6
Deal moulded handrail, sunk for balusters	0	2	0	9
Ditto do. ramped	0	5	2	0
Ditto Swan-neck. or level circular ..	0	8	2	6
Ditto, solid writhed.	1	0	6	0
Half-rails, two-thirds of the whole.				
Square framed newel, 3 inches	0	2	0	9
Ditto 4-inch stop chamfered with moulded cap and plinth ,, ...	0	8	2	0
Inch square bar balusters, each	0	1	0	8
Fixing iron column or newel, each ..	0	0	4	0
Ditto iron balusters do. ..	0	0	1	6
Ditto stays do. ..	0	0	0	9

Iron newels, balusters, and stays, charged extra at per lb.

Per super foot.	Materials. s.	d.	Labour. s.	d.
Base, surbase, double architraves, cornice, and skirting mouldings..	0	8	1	0
Ditto, if worked by hand	0	9	1	6
Reeded mouldings in pilasters, &c. ..	0	6	0	9
Church Gothic cornices worked by hand	1	0	2	0

CLARKE'S PATENT SHUTTERS.

Per foot super.	*s.*	*d.*
Steel self-revolving safety shutters for shop fronts and private houses, *imported*, but not fixed ..	4	6
Self-coiling revolving wood shutters, ditto	3	3

COLUMNS AND PILASTERS.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
1¼ inch deal, diminished columns, glued and blocked, not less than 14 inches diameter at the base	0	10	2	0
Ditto, from 14 to 10 inches, do.	0	11	2	4
Ditto, under 10 inches do.	1	0	2	8
If 1½ inch deal, add	0	1	0	2
1¼ in plain pilasters, glued and blocked	0	6	0	9
1½ in. do. do.	0	7	0	10
Capitals and bases prepared for carvers or turners, glued in thicknesses, not exceeding 3 ins. thick	2	0	2	4
Ditto glued upright and blocked for do.	2	4	3	0

Reeds or flutes to columns, one-half more.

TURNING to be charged extra, as per page 87.

FRIEZE AND CRADLING.

Per foot super.	Materials. s.	d.	Labour fixed. s.	d.
Cradling, to entablature, 1½ in. thick ..	0	4	0	6
Inch tongued frieze to shop fronts, &c..	0	4	0	8
1¼ inch ditto	0	5	0	10
Ditto, Doric friezes with triglyphs, &c. ..	0	5	2	1
Straight mitres, each	0	0	1	0
Circular ditto	0	0	1	8
Plancier, both edges rounded, per 1. ft..	0	1	0	2
Ditto, moulded do. ..	0	1	0	3

Reeds or flutes, as in pilasters.

N B.—The soffit and plancier must be taken as deal, wrought, and framed.

Per foot run fixed.	Materials s.	d.	Labour. s.	d.
¾ inch and inch common O.G. astragal, &c.	0	0¼	0	0½
Ditto, quirked O.G. ovolo, &c.	0	0¼	0	0¾
Inch rounded or moulded nosing ..	0	0	0	1
Beaded capping, with O.G. under ..	0	1	0	3
Narrow skirting grounds..	0	1	0	1½
Ditto grooved or rebated..	0	1	0	2
Square angle staff, rebated	0	0½	0	2½
1¼ inch angle bead	0	0½	0	2
Glued and mitred borders to hearths, &c.	0	1	0	6
1¼ and 1½ inch common O.G. astragal, torus, ovolo, or bead, fixed	0	0½	0	1½
Single-faced architraves, 4 or 5 inches wide	0	1½	0	4
Deal moulded hat rail, per foot run ..	0	2	0	5

SKIRTINGS AND ARCHITRAVES.

Including plugging, fillets, and backings.
Machine made and fixed complete.

Per lineal foot.	4 inch. s.	d.	5 inch s.	d.	6 inch. s.	d.	7 inch. s.	d.	8 inch. s.	d.
Skirtings beaded or moulded	0	3	0	4	0	5	0	6	0	7
Architraves single faced ...	0	4	0	5	0	6				
Ditto, double faced ..	...		....		....		0	9	0	10
	9 inch.		12 inch		14 inch.		6 inch.		18 inch.	
Skirtings double sunk and moulded	0	6	0	9	1	0	1	1	1	2
Ditto, plain or moulded ...	0	5	0	6						

If made by hand add one-fourth to these prices.

Fixing machine-wrought architraves or skirtings, costs about 2d. per lineal foot, including plugging and mitring, or scribing at corners.

N B.—The whole of the foregoing items in Carpentry and Joinery are cast out at 15d. per hour, with deal at 4d. per sup. foot 1 inch thick, and are about the cost price for ordinary work under the most favourable circumstances. In estimating at 1s. 6d. per hour, add one-fifth to the labour, and at least 10 per cent. on the whole cost, for incidental expenses besides profit.

CEDAR JOINERY for extra labour in working, and the better class of work required for varnishing, together with the high price of cedar, add 100 per cent. to the cost for similar deal joinery.

Circular work of every description in Joinery to be charged as follows, viz. :—

Flat sweep, not more than ½ inch rise per foot, or curves of circles not less than 3 feet diameter, once and half the price of straight work.

Quick sweep, or more than ½ inch rise per 12 inch chord, twice the price of similar straight work.

Elliptical, the same, according to sharpness of the curves.

The above proportions apply to the shape on the plan, or to the elevation only. If they occur on both plan and elevation as circular circular, they must be reckoned twice or three times the price of circular on plan only, *e.g.* if flat sweep on both plan and elevation, the proportion would be 1½ x 2 = 3 times the price of straight work. If quick sweep on both plan and elevation, the proportion would be 2 x 3 = 6 times the price of similar straight work. If flat sweep on plan and quick in elevation, 4½ times. If quick sweep on plan, and flat in elevation, 4 times.

Circular sashes, frames, shutters, &c., to be measured square, and circular heads to doors, &c., to be measured square above the springing, which gives an addition of 21½ per cent. on the net measurement, exclusive of the extra charge determined by the previous Rules.

Circular, plain glued in thicknesses, for all degrees of curvature take twice the price of similar straight solid work, and if circular circular, from 3 to 4 times, according to sharpness of curves.

CORNICES.—In measuring cornices the mouldings do not include the splay of weathering which is to be taken as boarding, wrought, &c., as the case may be.

THE COST OF LABOUR for *Joinery* on Australian Cedar, Huon Pine, &c., is from 10 to 20 per cent, more than the cost of similar labour to deal ; but the labour to Australian hardwoods if well seasoned costs from 50 to 75 per cent. more than the cost of similar work to deal.

In CARPENTRY, where the surfaces are not wrought, the extra labour required in hardwoods seldom exceeds 15 per cent. more than the labour on similar deal scantlings. The cost of roofing in hardwood or Oregon for this reason is about the same, including materials.

SUNDRY ESTIMATES.

BACK DOOR AND FANLIGHT.

Fixed complete.

	£	s.	d.
1¾ inch pine, bead butt and square, glazed 2 light fanlight, 24 sup. feet at 1s. 6d. ..	1	16	0
5 x 3 hardwood rebated frame with transome 4 inch architrave 6s. ; furniture, painting and hanging, 24s	0	18	0
	1	10	0
Cost price	£4	4	0

Fixed complete.

	£	s.	d.
2 inch pine front door, double raised moulded with transome light, 26 oz. glass, glazed and swivel hung. 27 sup. feet at 2s.	2	14	0
5 x 3 hardwood rebated and beaded frame and transome rail fixed and painted	1	0	0
23 lin. feet, 5 inch sing. faced architrave fixed	0	8	0
Graining oak and varnishing, 2 coats, 8 yds..	1	0	0
Furniture, ordinary, and hanging door, &c. ..	0	18	0
Cost price..	£6	0	0

INSIDE DOOR, JAMBS, &C.

Fixed complete.

1½ inch cedar double moulded, 4 panel door 7 feet x 3 feet	2	0	0
Jamb linings, cedar, 10½ x 1½, double rebated and fixed, including plugging	1	12	0
Cedar 5 inch single faced architraves, 2 sets secured to plugs complete	1	6	0
9 sup. yards spirit varnishing 11s.; furniture 12s., hanging 5s.	1	8	0
Cost price..	£6	6	0

PARQUET FLOORING, *Anglo-Swiss* in polished hardwoods, viz., ebony, oak, walnut, maple, cherry, &c., one inch thick, T. G. and secretly nailed, well seasoned and very durable. It can be laid complete from 18s. per sup. yard, exclusive of the cost of common floor about 6s. upon which it is laid.

Parquet Flooring, English veneer, one-quarter inch thick, polished woods glued to canvas, costs if laid by colonial workmen about 18s. per sup. yard for labour only, including borders, mitring round hearths, doorways, &c. The price imported without laying is low, but it is inferior in durability, and is not so well adapted to this climate as the Anglo-Swiss parquetry.

	£	s.	d.
Forms 17 ins. high, tops 9 ins. wide, p. lin. foot	0	3	6
Ditto, 15 ins. high, tops 8 ins. wide do ..	0	3	0
Ditto, 12 ,, ,, 7 ins. wide, for infants with cedar backs 3 x 1¼ ins., supported with iron stays, ⅞ x ⅜, not more than 4 feet apart	0	6	0
Desks 26 ins. high, 15 ins. wide, screwed to iron standards which are screwed to floor, 5 feet apart, per lin. foot	0	3	0
Ditto, 24 ins. high, by 14 ins. wide ditto..	0	2	6
Tablets 24 ins. x 18 ins. x ¾ ins. each..	0	6	0
Ditto, 18 ins. x 16 ins. x ¾ ins. do. ..	0	5	0
Book press 3 ft. wide, 4 ft. high, and 18 ins. deep	5	0	0
Strong wooden chairs, polished cedar each ..	0	10	0
Table, polished cedar, 3 ft. x 2 ft., with 2 drawers and turned legs	3	10	0
Ditto, 5 ft. x 3 ft. ditto ..	5	10	0
Black board, 4 ft, x 3 ft. x 1¼ thick, stained black	1	1	0
Easel for board, 5 ft. 6 ins. high, varnished, 2 coats	1	7	6
Iron hat pegs, 9 ins. apart on 2½ x 1 beaded batten, secured to wall and painted 3 coats, per lin. foot	0	0	3
Light folding tripod (to show maps on) 7 ft. 6 in. high, with 1½ in. round legs, hinged to a 2 in. top.	1	17	6
Pointer, 5 ft. x 1¼ in. diam., tapering to ½ in. diam	0	3	6
Beaded batten, 3 x ¾, fixed to wall to hang maps and tablets on, painted 3 coats, per lin ft. ..	0	0	2

TURNERS' WORK.

Turners' wages 1s. 1d. per hour, and Clear Pine 5d. per sup. foot.

Per Pair.	Labour only. s.	d.	Clear Pine. s.	d.
Tuscan base and Capital for 6 inch column ...	2	6	1	0
Ditto ditto 9 inch column ...	3	6	2	6
Ditto ditto 12 inch column ...	4	6	5	0
Doric base and capital for 6 inch column ...	3	6	1	0
Ditto ditto 9 inch do. ...	4	6	2	6
Ditto ditto 12 inch do. ...	5	6	5	0
Base and cap for 4 inch verandah post ...	3	0	0	8

	Labour only.		Clear Pine.	
Each.	s.	d.	s.	d.
Ionic base for 6 inch column (major diam.) ...	3	4	0	8
Ditto 9 inch column	4	0	1	6
Ditto 12 inch column	4	8	3	0
Corinthian or Composite base for 6 in. column	4	0	0	8
Ditto ditto 9 in. do ...	5	0	1	6
Ditto ditto 12 in. do....	6	0	3	0
Ditto capital for carving 6 in. do....	2	8	1	6
Ditto ditto 9 in. do....	4	8	3	0
Ditto ditto 12 in. do....	6	8	6	0
Newels 3 in. diameter and 4 feet long	1	6	1	4
4 in. ditto ditto	2	6	2	6
5 in. ditto ditto	3	0	3	0
6 in. ditto ditto	5	0	4	0
8 in. ditto ditto	7	6	7	6
10 in. ditto ditto	13	6	12	0
Balusters ordinary for staircases. 2 in. diam. ..	0	8	0	3
Ditto best ditto ditto ...	1	0	0	3½
Ditto best with spiral column, ditto	4	0	0	4
Ditto for parapets, loggias, &c., 3 in. diameter and 12 ins. high...	1	0	0	4
Ditto 4½ in. diameter and 18 ins. high	2	0	0	11
Ditto 6 in. do.. and 24 ins. do.	3	4	2	0
Solid ball for finial, &c., 4 ins. diameter ...	2	8	0	6
Ditto do. 8 ins. do. ...	4	0	1	8
Ditto do. 12 ins. do. ...	5	4	4	0

Per lineal foot.				
4 in. verandah post (shaft) for base and cap ...	0	8	0	6
Circular mouldings (circumference measurement) per inch wide	0	3		
Ditto per super foot, ...	2	8		

ADELAIDE PRICES OF BUILDING MATERIALS.

Doors.

Feet.	Inches.		Feet.	Inch		Inch,		Each. s.	d.
6	6	x	2	6	x	1¼	single moulded ..	13	0
6	6	x	2	6	x	1¼	double ,, ...	14	0
6	6	x	2	6	x	1½	,, ,, ...	15	6
6	8	x	2	8	x	1¼	,, ,, ...	15	6
6	8	x	2	8	x	1½	,, ,, ...	18	0
6	8	x	2	8	x	1¾	,, ,, ...	19	0
6	10	x	2	10	x	1½	,, ,, ...	19	0
6	10	x	2	10	x	1¾	,, ,, ...	23	0
7	0	x	3	0	x	1½	,, ,, ...	26	6

Feet	Ins.		Feet	Ins.		Inch.		Each. s.	d.
6	8	x	2	8	x	$1\frac{3}{4}$	four panel raised moulding	25	0
6	10	x	2	10	x	$1\frac{3}{4}$	four panel raised moulding	27	6
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ...	30	0
6	8	x	2	8	x	$1\frac{3}{4}$	Panels raised and raised moulding	31	0
6	10	x	2	10	x	$1\frac{3}{4}$	Panels raised and raised moulding	35	0
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ...	38	0
6	8	x	2	8	x	$1\frac{3}{4}$	Bead and butt	25	0
6	10	x	2	10	x	$1\frac{3}{4}$	,, ,, ...	28	0
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ...	30	0
6	8	x	2	8	x	$1\frac{3}{4}$	Bead and flush	28	0
6	10	x	2	10	x	$1\frac{3}{4}$	,, ,, ...	30	0
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ...	33	0
6	10	x	2	10	x	$1\frac{3}{4}$	Circular top raised panel and raised moulding	40	0
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ...	40	0

Sash Doors.

Feet	Inches.		Feet	Inches		Inch.		s.	d.
6	6	x	2	6	x	$1\frac{1}{2}$	Sunk panels with margin lights	23	0
6	8	x	2	8	x	$1\frac{1}{2}$	,, ,, ..	25	0
6	10	x	2	10	x	$1\frac{1}{2}$	,, ,, ..	28	0
7	0	x	3	0	x	$1\frac{3}{4}$	,, ,, ..	31	0

Sashes.

Inch.		Inch.		Cedar, per pair. s.	d.			s.	d.
8	x	10	Sash glazed 6 panes	11	0	with box frames		34	0
10	x	12		13	0	,,	,,	38	0
10	x	14	,, ,,	16	0	,,	,,	42	0
12	x	14	,, ,,	18	0	,,	,,	45	0
12	x	16	,, ,,	18	6	,,	,,	45	0

				$1\frac{1}{2}$ inch. s.	d.	$1\frac{3}{4}$ inch. s.	d.
2 light sashes and frames,	6 x 3	daylight		50	0	58	0
4 ,,	,,	,,		45	0	53	0

Venetian Shutters.

Pine shutters, 18s. to 25s. per pair.
Segmental heads to same, 4s. per foot super.

Door Frames.

Deal frames, 4½ x 3 with Jarrah sills for doors,
6·8 x 2·8, ... each 16s.
Ditto, 6·8 x 2·8, with fanlight.. .. .. ,, 25s.
Ditto, with side light and fanlight .. .. ,, 45s.

Jamb Linings.

	Pine. s.	d.
Jamb linings, 6 inch per set, D. Rebated.. ..	8	0
Ditto 10½ ,, ,, ...	13	0
Ditto 16 ,, ,, ...	20	0
Skeleton jambs 13	0 to 15	0

Architraves, Mouldings, &c.

	s.	d.
8 inch double faced architraves, per 100 lin. ft. ..	34	0
7 inch ditto do.	33	0
6 ,, ditto solid	24	0
5 ,, single faced architraves, solid	19	0
4½ ,, ,, ,, ...	13	6
4 ,, ,, ,, ...	12	6

Special prices are quoted for cedar architraves.

Skirtings, &c.

	Per 100 lin. ft. s.	d.
12 inch double sunk and moulded	38	0
9 ,, plain O.G. moulded	23	0
11 ,, ditto	29	0
7 ,, ditto	18	0
9 ,, plain torus moulded	23	0
11 ,, ,, ,, ...	29	0
7 x 1 ,, ,, ...	18	0
7 in. x ¾ in. torus or O.G. moulded	15	6

Sawing.—Hardwood, 6s.; softwood, 4s. per 100 sup. feet, one inch thick.

Good Cedar 8d. per foot sup.

American Pine.

All thicknesses clear pine, 40s. per 100 sup. feet.
Dressed shelving .. 26s. ditto.
Dressed redwood shelving 34s. ditto.

Hardwood.

3 in. x 2 in. hardwood scantling, 8s. 6d. per 100 lin. feet.
4 in. x 2 in. and 4 in. by 3 in. to 9 in. ditto, 18s. ditto.
3 in. x 1 in. battens, 15s., ditto.

T. and G. Flooring and Lining.

	s.	d.
4 x 1¼ Pitch Pine, T. & G., per 100 sup. feet, reduced	32	0
4 x 1⅛ T. & G. pine flooring, per 100 lin. feet ..	14	6
1 inch Kauri T. & G. ,, ,, ..	13	6
6 x 1⅛ Baltic flooring ,, ..	13	0
6 x 1 ,, ,, ..	12	6
6 x ⅞ ,, ,, ..	11	0
6 x ¾ ,, ,, ..	10	0
6 x ⅝ ,, beaded ,, ..	9	0
6 x ½ ,, ,, ,, ..	8	6

Laths and Palings.

	s.	d.
3 feet split laths, per 1000	14	0
3 ft. 6 in. ditto do.	16	0
American laths, 4 ft. sawn, per 1000	22	0
Ditto 4 ft. 6 in ditto	28	0
Palings 5 ft. Hobart Town per 100	20	0
Do. 6 ft. ditto	27	0
Do. Launceston 5 ft., 22s., and 6 ft.	29	0

Mantelpieces.

	s.	d
Deal with carved trusses .. .. .. each	25	0
Cedar ,, varnished .. .. do.	40	0
Ditto, elliptical ditto .. .. do.	45	0
Ditto, circular ditto .. .. do.	60	0
Ditto, best with carved trusses and varnished ..	70	0

Trusses for ditto, deal 3s. 6d. to 5s. 6d. per pair.
Ditto cedar 6s. 6d. to 9s. 6d, do.

TIMBER, &c.

White deals 9 x 3 = 4½d. Red deals 9 x 3 = 5d. per lineal foot.
Pitch pine per cu. ft. 4s. ditto, 9 x 3, = 5½d. per lin. ft.
Baltic deals, 9 x 3, = 5½d. per lin. foot.
Spruce deals, 9 x 3, = 4½d. ditto.
Oregon, 9 x 3, = 5d.
Ditto in bulk per cube foot, 2s. 6d. to 2s. 9d.
Kauri pine boards, 12 to 18 ins. wide, 4½d. per sup. foot.
Huon pine, 7d. per sup. foot in boards and scantlings.
Pickets for fencing, Jarrah 5 ft. per 100, 18s.
Ditto fancy cut, 4½ ft. do. 25s.

ADELAIDE BUILDING MATERIALS.

Galvanized Corrugated Iron, best brands, 26 gauge, £19, and 24 gauge, £17 per ton. Other brands, £18 and £16 respectively. Plain sheets, £24.

Gal. iron screws or nails, 7d; rivets and iron washers, 6d. per lb.

Guttering, half round, 26 gauge 4 in. 2d., 5 in. 2½d., 6 in. 3d.; O.G. gutter, 4 in. 2d. 5 in. 2½., 6 in. 3d. per lin. foot.

Ridge capping 12 in. 3d., 14 in. 3d., 15 in. 3½d., 16 in. 4d. per lin. foot 26 gauge.

Down pipes, 2½ inch 2½d., 3 in. 3d. per lin. foot 26 gauge.

Spikes and tubes, 1s. 9d. per doz.

Zinc, No. 8, 9, and 10 gauge, 32s. per cwt.

Wire nails, from 1 to 6 in. long, 10 gauge and under, 19s per cwt.; 11 and 12, = 22s. and 13 gauge 24s. per cwt.

Lath nails ⅞ inch cut, 22s. per cwt.

Sash weights, 8s. per cwt.

Best compressed building bricks, 45s. per 1000.
Cement.—K. B. and S. and Gostlings 17s. per barrel.
Plaster of Paris ("Red Beach") 17s. to 19s. ditto.

Freestone at the Quarry.

Rough hearths, lintels, steps or sills p. sup. ft. 18d. to 2s. (from the Coal measures same as Sydney.)
Stone coping 15d. to 18d. p. sup. ft. Rubble per load 18d.
Ashlar 12 x 8 p. lin. ft. 13d. Headers for Ashlar each 3s. to 4s. 6d.
Quoins each 3s. to 5s. 6d. Footings per cube foot 1s. to 15d. (similar to Sydney freestone.)
Dimension stones per cube foot 15d. and upwards.
Wrought stone hearths steps and sills each from 10s. to 22s.
Ditto slate hearths p. sup. ft. 4s. 6d. stone hobs per pair 5s. to 6s. 6d.
Bricks at the kilns per 1000, common wire 35s. Sandstocks 50s., white facing bricks £5, moulded per cut extra.
Cement per cask, 17s. to 21s. Lime per bushel 1s. 6d.

COLONIAL PINE.

Per 100 *sup. feet redneed.*	*s.*	*d.*
Scantlings not more than 4 x 2	17	0
Ditto up to 12 ins. wide and 26 feet long	19	0
If wider or longer by agreement.		
Dressed lining boards ½ to ⅝ in stock lengths ..	20	0
Wrought T. and G. 1 inch flooring, stock lengths	21	0
Ditto ditto beaded one side ditto	22	0
Ditto ditto beaded both sides ditto..	23	0
Ditto chamfered and rebated 1 in. flooring ditto..	22	0
Ditto ditto and beaded ditto	23	0
Kauri or Dundathu pine up to 12 ins. wide ditto .	21	0
Cypress or she pine or Beech scantlings or boards ditto..	28	0
Beech wrought T. and G. up to 12 ins. wide ..	33	0
HARDWOOD not more than 4 x 2	19	0
Ditto cut to order under 6 ins. wide and 26 ft. long	21	0
Ditto for every 3 ins. wider extra	1	0
Extra length, by agreement.		
Ditto wrought T and G. 32s., if chamfered ..	33	0
Ditto arris rails out of 4 x 4, per 100 lin. ft. ..	18	0
Ditto ditto out of 4½ x 4½ = 22s. do. 5 x 5 ..	25	0

CEDAR boards up to 12 ins. wide per surface foot.
¼ in. 3½d., ½ in. 4d , ¾ in. 4½ 1 in. 5d.
1¼ in. 5¾., 1½ in. 6¾d., 1¾ in. 7½., 2 in. 8½d.
Boards over 12 ins. wide extra. Scantlings per sup. ft. 4½d.

SKIRTINGS.

Per 100 *lineal feet.*

	Pine.		Cedar.	
	s.	d.	s.	d.
6 x 1	11	6	24	6
7 x 1	13	0	27	0
8 x 1	14	6	30	6
9 x 1	16	0	36	6
10 x 1	17	6	40	0
12 x 1	21	0	46	0

ARCHITRAVES.

Per lineal foot.

	Pine.		Cedar.	
	s.	d.	s.	d.
4 inch	0	1½	0	3½
5 inch	0	2¾	0	5¼
6 inch	0	3½	0	6¾
7 inch	0	4	0	9
8 inch	0	4½	0	11

MOULDINGS.

Per 100 *lin. feet.*

	Pine.		Cedar.	
	s.	d.	s.	d.
1 inch	4	0	5	6
1¼ ,,	5	6	8	0
1½ ,,	6	9	9	6
1¾ ,,	7	9	13	0
2 ,,	8	9	14	6
2¼ ,,	9	6	16	6
2¾ ,,	11	0	19	6
3 ,,	11	6	22	0
3 x 1¾ in.			30	0
4 x 2 in.			50	0
2½ ,,	10	6	17	6

DOORS.

Each.

	Pine.	Cedar.
	s.	s.
6,6 x 2,6 x 1½	16	24
6,8 x 2,8 x 1⅝	18	26
6,10 x 2,10 x 1⅜	19	28
6,10 x 2,10 x 1¾	21	30
6,10 x 2,10 x 2	24	33
7,0 x 3,0 x 1¾	23	33
7,0 x 3,0 x 2	26	36

SASH DOORS.

6,10 x 2,10 x 1¾	21	31

SUNK PANELS AND MARGINS.

6,6 x 2,6 x 1½	22	30
6,8 x 2,8 x 1½	24	34
6,10 x 2,10 x 1½	26	36

	s.	d.	s.	d.
Folding doors 1¾ in. per surface foot	1	4	1	9

CEDAR SASHES.

Openings.	4 Panes. s.	d.
3 ft. 10 x 2 ft. 4	11	0
4 ft. 6 x 2 ft. 10¼	14	0
5 ft. 2 x 2 ft 10½	16	0
5 ft. 3 x 3 ft. 4	18	0
5 ft. 11 x 3 ft. 4	20	0
6 ft. 0 x 3 ft. 0	21	6

FRENCH LIGHTS.

	Pine. s.	Cedar s.
7 ft. x 3 ft. 0 x 1¾	31	41
7 ft. x 3 ft. 4 x 1¾	34	44
7 ft. x 3 ft. 4 x 2	36	46
7 ft. x 3 ft. 6 x 1¾	36	46
7 ft. x 3 ft. 6 x 2	39	49
7 ft. 6 x 4 ft. x 2	43	56

HARDWOOD BRIDGES.
Bolted for Water Tables.

	s.	d.
11 feet by 5 feet each	46	0
10 ,, 5 ,, ,,	42	0
9 ,, 5 ,, ,,	37	6
8 ,, 5 ,, ,,	35	0
14 ,, 4 ,, ,,	44	0
12 ,, 4 ,, ,,	40	0
10 ,, 4 ,, ,,	35	0
10 ,, 3½ ,, ,,	30	0
9 ,, 3½ ,, ,,	27	0

HARDWOOD GATES.
Each.

	s.
8 ft. x 4 ft.	22
8 ft. x 5 ft.	24
9 ft. x 5 ft.	26
10 ft. x 5 ft.	28
Hardwood palings 4½ to 6 ft. per 100 =	13
Ditto shingles p. 1000	24
Sawn pine ditto ,,	16

PORTLAND CEMENT.

As more definite information is desirable among those engaged in building, &c., as to the properties of Portland cement, the following facts may be useful :—

1. The finest ground cements are generally the best, and good cements are always very heavy.
2. The comparative value of cements is chiefly in proportion to their relative strength, shown by their breaking weight per square inch, when subjected to a tensile strain.
3. The greater strength of cement, compared with lime, is chiefly owing to the presence of alumina or clay, which is mixed with the carbonate of lime (chalk) to form cement.
4. The quickest setting cements contain the most clay, but are not so strong as the slow setting cements.
5. The great competition among cement manufacturers has resulted in a wonderful improvement in the value of cement, which is now at least double the strength it was 40 years ago. The great importance of this improvement in *construction* generally, proves it to be the greatest achievement of the age, in manufactured building materials. *Vicat*, the celebrated French hydraulic engineer, gives the tensile strength of hydraulic mortar as 136lbs per square inch. We have now Portland cements with a tensile strength of 634 lbs. per square inch, when mixed neat without sand, and 325 lbs per sq inch when mixed with double the quantity of sand.

The following Table shows the comparative average tensile strength of six kinds of Portland cement, per sq. inch, when tried upon *briquettes*, or bars of cement 1½ inch x 1½ inch ; 10 samples of each cement were mixed pure, or of neat cement, and 10 samples of one-third cement and two-thirds sand, at the Sydney Int. Exhibition, (120 *bars* in all). Each *bar* was allowed 24 hours to set and was then put into water for 6 days, when it was taken out and forthwith tested, with the following results :—

International Exhibition, Sydney.	Pure cement. Lbs. p. sq. in.	¼ cement. Lbs. p. sq. i
"Stern" Portland cement, Settin	634	325
J. B. White and Brothers, London	490	217
Stettinger Portland cement, Stetting ...	417	207
Johnson and Co, London	415	197
Schifferdecker and Söhne, Heidelberg ...	414	185
N. Josson and De Langle, Auvers	395	164

The report of the Judges was therefore chiefly in favour of "Stern" cement, giving a *special award*.

Knight, Bevan and Sturge's Portland cement is among the best manufactured. It has been extensively used in England, France, Germany, Holland, &c, for the last 25 years, and its superior merits duly attested by the best engineers of those countries It has been largely used in the construction of public and private buildings an engineering works of Australia, where it has given general satisfaction. In all large engineering works every cask of cement is tested, because it was found that bad cement sometimes came from the best manufacturies. This may be owing to a slight difference in the burning, or fineness in the grinding, or from false brands.

Brooks, Shoobridge and Co's. Anchor brand Portland cement.—By experiments made in November, 1881, at the Town Hall and Public Works Office, Sydney, 2 bars of their neat cement broke with an average tensile strain of 520 lbs per square in., these briquettes were placed in water for seven days and tested within 4 hours after being taken out. Similar experiments were made by Adies' machine on the 20th July, 1882, in the presence of the City Surveyor and City Engineer, at the Town Hall, Sydney, when the average of 3 tests gave 581 lbs. per square inch as the tensile strain.

The latest experiments were made with a sample of this cement at Dalton's Stores, Sydney, taken from a shipment of 400 casks by an Officer of the Harbours and Rivers Department. The six briquettes of neat cement were made on non-absorbent beds, kept in air for 24 hours and in water for 6 days, when they were taken out and forthwith tested with a result of 570 lbs. per square inch obtained by Adies' testing machine commencing with a strain of 200 lbs. per square inch and increasing it to the rate of 200 lbs per minute. The neat cement when passed through a seive of 5806 meshes per square inch left a residue of 14 per cent., and when mixed with 19½ per cent. of its weight of water, set in 1½ hours. The tensile strength of pure cement required by this Government is 400 lbs. per square inch.

For further particulars see Advertisement at end of book.

At the Melbourne Int. Exhibition in 1880 the best cements were made into *briquettes* of pure cement 1 inch square with the following results as to their tensile strength :—

1st award to J. C. Gostling	1021 lbs.
2nd award Toepffer, Grawitz & Co., "Stern" Cement Company, Stettin	828
Schifferdecker and Söhne, Heidelberg...	860

The samples were tested by Holsterement's testing machine.

"The "Stern" Cement Company disputed the fairness of the tests, believing they were fairly entitled to the first award.

The different results shewn by the last list with similar cements tested in Sydney and elsewhere prevent comparison, except within itself.

Alsen and Son's Portland cement has been largely used by the Harbours and Rivers Department, Sydney, &c., having withstood severe tests made by J. B. Mackenzie, Esq., of that Department, on the 29th Feb., 1884, at the Government Dock Yard, Biloela, near Sydney, the result showing that—

Quick setting neat cement (setting in 165 minutes) after passing through a seive with a mesh of 5806 holes per square inch or 76·2 per lineal inch, was mixed with 21 per cent. by weight of water into 6 briquettes or bars one inch square. These were put into water after 24 hours, where they remained for a week. They then bore an average tensile strain of 465 lbs.

Six briquettes of slow setting neat cement, setting in 300 minutes, were made with 19½ per cent. of water and after the same interval were subjected to a similar test showing an average strain of 691 lbs. The residue remaining in the above seives was only 12 per cent. of the quick setting and 14 per cent. of the slow setting cement.

Mr. J. C. Newberry, of the Museum, Melbourne, well known as a scientific gentleman, made similar experiments with Alsen and Son's cement in April, 1884. He found that one inch briquettes, after being made 7 days broke with an average tensile strain of 402 lbs. After 6 weeks a number of the same batch of briquettes broke with an average tensile strain of 603 lbs. [See advertisement in this book.]

Iron imbedded in cement is preserved, but in plaster of Paris or common mortar it will oxidise, galvanized hoop-iron is therefore considered preferable to black iron for bonding brickwork in mortar.

When cement is partially set it will harden much faster in water than in air, it will also set and harden faster in warm water than in cold water. In summer the increased temperature of the water which in cold air would give increased hardness to the cement is counteracted by the hot air *drying* the cement before it sets; this disadvantage can only be met by repeatedly soaking the cement while setting.

Time required in setting.—This is very uncertain, but with slow setting cements their greatest strength is not attained even in 12 months. The tests at the Sydney and Melbourne International Exhibitions, &c., were made seven days after the mixing of the cement, and do not, therefore, show their ultimate strength.

RENDERING, LATHING, &c.

Per super yard.	Materials. s.	d.	Labour. s.	d.
Render or plaster rough on walls	0	5	0	5
Ditto and set with fine stuff, 2 coats . .	0	8	0	7
Render, float, and set with tinted fine stuff (3 coats trowelled)	0	10	0	9
Lathing only, stout laths to partitions . .	0	4	0	4
Ditto and plaster, or lay one coat, do . .	0	8	0	8
Ditto, lay and set 2 coats, do. . .	0	11	0	11
If to ceilings, add to the last 3 items . .	0	0	0	2
Lath 2 coats and set with angles floated to ceilings, or lath, lay, float, and set, trowelled and tinted 3 coats to partitions	1	2	0	10
If set with gauged putty, add	0	2	0	1
If set with plaster of Paris, add	0	4	0	2
Lath lay, float, and set to jambs, friezes or soffits per sup. foot	0	2	0	3
Render, float, and set to ditto do. . .	0	1	0	2

The tints used for the setting coats are generally French gray drab or salmon ; other tints are charged for extra, chrome yellows are always clouded

The quirks next wooden beads are included in the prices.

The mortar is reckoned at one-third stone lime and two-thirds clean sand, mixed with long ox hair—thickness, $\frac{3}{4}$ inch.

In consequence of the suction from the dry bricks, brick walls in Australia are generally rendered in one coat only, and the plaster does not harden but leaves a dry powder under the hard trowelled skin. If the walls were saturated with water the plaster would be much harder, and this hardness could be indefinitely increased by daily watering the plaster for a week at least, especially during hot weather. This might be objected to in winter, when buildings are already delayed by the plaster drying too slowly. In Great Britain, France, &c, this difficulty is overcome by stove drying the best buildings.

FLOORS.

Per super. yard.	Materials. s.	d.	Labour. s.	d.
Keene's cement (3 to 1) 1 inch thick on 2 inches of cement concrete	2	9	1	3
Portland cement ditto on ditto	1	9	1	0
Pugging 2 ins. thick of coarse stuff or mortar on sound boarding	0	8	0	6

If the render is 2 of cement to 1 of sand add one-fourth to the price of materials.

	£	s.	d.
Minton's or Maw's flooring tiles, per super. yard from .. .. 17s. to	3	10	0
Laying same on prepared floor or concrete ditto, labour only from .. .. 15s. to	1	5	0
Laying hearths, about 5,0 x 1,6 each ditto ..	1	0	0
Minton's and Maw's coving tiles, 6 x 6 x ⅜ from	0	1	0
Ditto border tiles, 8 x 8 x ½ each from ..	0	2	0
Ditto border or hearth tiles, 6 x 6 x ½ each from	0	1	6
Lime concrete foundation, 2 ins. thick, for same, per sup. yard	0	0	8
Cement ditto ditto ditto	0	1	0

Stucco or External Plastering.

Per yard super,	Materials. s.	d.	Labour. s.	d.
Bastard, or rough stone lime stucco jointed on brick or stone walls	0	8	0	10
Ditto on lath, including lathing	1	0	1	0
Trowelled stucco, on brick or stone ..	0	8	1	1
Ditto, on lath and lathing	1	1	1	3
Trowelled or floated jambs, frieze or soffit on brick or stone, per foot sup... ..	0	1½	0	2
Ditto, on lath, including lathing	0	2	0	3
Raised margins to form panels, 4 inches wide moulded, per foot run	0	2	0	4
4½ inch reveals to windows do. ..	0	1	0	2
9 inch ditto do. ..	0	2	0	3

The above materials include stone lime (at 1s. 6d. per bushel) which is best adapted for stucco or external plastering.

Mem.—9 bushels of lime, 1 cube yard of clean, sharp sand, and 6 pecks of loose cow hair will suffice for the following finished work, 1 inch thick :—

37 sup. yards render or rough stucco and set
35 sup. yards lay or rough stucco on lath and set
32 sup. yards, render 2 coats and set or float, or
30 sup. yards, lay 2 coats, and set or float.

Stucco or lime plaster for external uses is now superseded in the Australian cities by Portland cement *compo.*, although samples of stucco are to be found in Sydney. Bowenfels, &c., in a good state of preservation after 20 years' exposure to all weathers. In country districts where stone lime is more easily obtained than Portland cement, stucco may be used with great advantage and if properly *trowelled* and coated with *chunam* will be equal in durability to cement *compo.*

Including lathing (if bracketted) or dubbing out.

Per foot run.	Materials. s.	d.	Labour. s.	d
Plain impost or other mouldings 3 in. girt	0	2½	0	3
Ditto, from 3 to 6 inches girt	0	3	0	4½
Ditto, from 6 to 9 inches girt	0	5	0	7
Astragals, O.G.'s, ovolos, small reed, or other mouldings under 3 inches girt ..	0	2	0	2½
Cornices, with soffit and frieze, the whole girt to be taken at per foot super	0	6	0	9

ENRICHMENTS, centre flowers, &c., see Index

The plaster is always used in a pure state without sand.

PORTLAND CEMENT STUCCO.

Per yard super.	Materials. s.	d.	Labour. s.	d.
Rough render, in cement..	1	0	0	9
Plain face, on brick or stone, jointed ..	1	4	1	2
Ditto on lath including lathing	2	0	1	5
Cornices as before per foot super. ..	0	4	0	9
Large skirtings, per sup. foot.	0	4	0	8
Plain facia, frieze or pilasters, do. ..	0	4	0	6
Astragals, ovolos, O.G.'s, and other mouldings, grooves, or sinkings, under 3 inches girt, per foot run ..	0	1½	0	3
Ditto, from 3 to 6 inches do.	0	2	0	4½
Ditto, from 6 to 9 inches girt, do. ..	0	3	0	6
4½ inch reveals or margins, per foot run	0	2	0	2
9 inch do. do. do. ..	0	3	0	3

N.B.—The above prices for materials are reckoned at 5s. per bushel for Portland cement, and 6d. per bushel for clean-washed sand, mixed in the proportion of 1 of cement to 3 of sand, and averaging ¾ inch thick.

If 1 of cement and 2 of sand is required, add one-fourth to the price of the materials.

CEMENT.—In using cement for fine joints of brick, or ashlar, it cannot be too pure; but for plaster, best fresh Portland cement will take from 3 to 5 times its bulk of sand, if painted.

The relative value of cements is in proportion to their tensile strength. Taking 3 samples of cement whose tensile strength is equal to 300, 450, and 600 lbs. per square inch respectively. If the first would require one-third cement, the second would be equally strong with one-fourth, and the third with one-fifth cement,

Porosity. All exposed flat surfaces, or weatherings, should be set in pure cement, the addition of sand makes it porous in proportion to the quantity used.

Experiments were made by the Education Department, Sydney, with cement render similar to that generally used for the lining of brick in cement tanks.—A trough was made 11 ins. x 7 ins. x $3\frac{3}{4}$ ins. outside at top, the sides being slightly bevelled inwards and with the bottom about $\frac{3}{4}$ inch thick. It consisted of one part Anchor brand cement and 2 parts Sydney blown sand and weighed dry 6 lbs. 6 oz., after being filled with water for a week, it weighed 6 lb. 11 oz. the slate upon which it stood showing an almost imperceptible dampness

Portland cement stucco should be rendered and set or *roughed in* and finished in two coats, the second, or setting coat, can be added before the first coat dries, otherwise it must be scored with a pointed lath, or nail rake. In every case the walls should be saturated with water before the stucco is applied or its stability cannot be guaranteed; it is also necessary, if the cement is to become hard throughout, or properly set, that it be saturated with water daily, from 3 to 14 days, according to the heat of the weather, until there is no more suction, otherwise the cement stucco or plaster will merely have a hard surface, while the bulk remains a dry powder. The imported cement is, with very few exceptions, really good, but is too often badly treated.

KEENE'S MARBLE CEMENT.

Dubbed out with cement compo.

Per yard super.	Materials. s.	d.	Labour. s.	d.
Medium trowelled on brick or stone ..	2	9	1	3
Ditto, on lath including lathing	3	4	1	6
Panels moulded (small)	0	7	0	9
Per foot Super.				
Facias, jambs, pilasters, architraves ..	0	5	0	7
Plain mouldings, medium cement.. ..	0	9	0	11
Ditto, skirtings, 9 to 18 inches high, with 3 inches moulded, or sunk and moulded	0	9	0	9
Superfine, plain face and polished, do. ..	0	9	1	0
Ditto pilasters, friezes and pedestals ..	0	9	0	9
Superfine cement plain mouldings ..	1	0	1	3
Superfine cement polished buff	1	3	1	3
Ditto, do. green	1	6	1	3
Ditto, do. blue	2	0	1	3

If circular, as in columns, groins, &c., add one-fourth.

The above items are reckoned to contain one-third Keene's cement to two-thirds clean, sharp sand, and plain work to average $\frac{3}{4}$ in. thick.

MATERIAL REQUIRED *for ¾ in. thickness of Compo., Portland cement or Keene's cement plastering* :—

1 bushel cement and 1 bushel sand will cover 3 sup. yards
1 do. cement and 1½ bushels of sand will cover 3¾ sup. yards
1 do. cement and 2 of sand, 4½ sup. yards.
1 do. cement and 3 of sand, 6 „
1 do. cement and 4 of sand, 7½ „

N.B.—By adding ½ to the number of sup. yards, the area at ½ inch thick, or deducting one-third. the area at 1 inch may be obtained.

In MEASURING PLASTERING, a variety of opinions exist, all of them tending more or less to misunderstanding, and consequent litigation The least objectionable method is to take the *net measurement* at a price calculated to meet the cost of work under consideration, including all extras; and this is the system recommended by the Melbourne Association of Plasterers.

Ordinary openings with 4½ inch reveals are not deducted.

The price for 4½ inch reveals in Portland cement as per page 100 is 4d. per lin. foot. Taking a 6 ft. x 3 ft. window, the reveals will cost 5s,, which is also the cost of 2 sup. yards of cement stucco.

The weathering of cornices to be taken as plain work.

If circular, add one-fourth, if circular circular, as in domes or concentric arches, add one half to each item.

Scaffolding to be charged extra, if erected expressly for the work.

In taking the height of walls for inside plastering, measure down to *skirting grounds*, if no grounds, then down to the floor, deducting all openings except for "labour only."

If more than 4 mitres in one room they are allowed for in measuring cornices.

LIME WHITE, WHITEWASHING, &C.

Per super yard.	Materials. s.	d.	Labour. s.	d.
Lime white, one coat (lime and water) ..	0	1	0	2
Ditto, two coats do ..	0	2	0	4
Wash, stop, and white-washing with whiting and size to old work ..	0	2	0	6
Ditto, to old ceilings, ornamented ..	0	2	0	9
Plain cornice washed, stopped and whited per foot super, with whiting and size..	0	0½	0	1½

Half a bushel of quick lime is required for 70 super yards of lime-white, one coat. 12 lbs. whiting, ½ lb. blue black, and 7 qts. of size will do the same quantity of white wash, equal to 40 s. yds. per gal.

Cement stucco or plaster is too often coloured with lime white, mixed with about one-fifteenth the quantity of oil (generally raw linseed oil, although black oil or common tallow will do), while hot from the slaking of the stone lime. One gallon will cover from 35 to 40 sup. yards one coat, or about 28 sup. yards two coats. Although nearly waterproof, it will seldom withstand continuous driving rain on exposed walls.

	£.	s.	d.
Plasterer, per hour (net wages)	0	1	6
Labourer, do. do.	0	1	0
Plaster of Paris, fine, per cask, 3½ bushels ..	0	16	0
Ditto, superfine do.	1	0	0
Portland cement do. in Sydney ..	0	18	0
Marble cement (Keene's medium) do.	1	13	0
Ditto, superfine do.	2	5	0
Ditto, coarse	1	8	0
Heads lime, per bag (Melbourne) 2s. 3d to	0	3	0
Geelong roach do. do. .. .. 4s. to	0	5	0
Hobart Town lime at Melbourne, per bag of 3 bushels	0	3	0
Clean sharp sand, per load of 18 bushels, or 23 cu. ft., within a mile .. .. .. 3s. to	0	5	0
Stone lime in Sydney, per ton	2	10	0
Hair, colonial, in Sydney, per bushel	0	1	6
Carting, one mile, per one-horse load, including loading and unloading	0	2	3
Ditto, for every extra mile	0	0	9

For laths in Melbourne and Sydney, see pages 62 and 72

MODELLING AND CASTINGS.

Items Each.

Modellers, 2s., and Casters, 1s 6d. per hour.	Modelling in clay. s.	Plaster Castings fixed. s.	d.
Ionic capital, for 12 inch column ..	80	40	0
Ditto, 18 do.	120	50	0
Ditto, 24 do.	160	60	0
Corinthian or Composite capital, for 12 inch column	100	60	0
Ditto, 18 inch column	140	80	0
Ditto, 24 do.	200	100	0
Pilasters the same as capitals, quarter pilasters, one half.			
Modillion enriched, 4 inch projection ..	20	2	0
Ditto, 6 inch do. ..	24	3	0
Ditto, 8 inch do. ..	32	4	0
Cantilevers or trusses, 10 in. x 5 in. ..	24	6	0
Ditto, 12 in. x 6 in. ..	28	8	0
Ditto, 18 in. x 9 in. ..	40	10	6

Items each.	Modelling in clay. s.	Plaster Castings fixed. s.	d.
Pateræ or rosette, 4 in. diam.	8	1	0
Ditto, 8 in. do.	12	3	0
Centre or ceiling flower, 12 in. diam. ..	24	5	0
Ditto, 18 do. ..	32	8	0
Head on keystone, 12 inches deep ..	18	10	0
Ditto, 15 inches ,, ..	20	14	0
Ditto, 18 inches ,, ..	24	18	0
Head on 4 inch cymatium of cornice ..	10	2	0
Ditto, 8 do.	12	3	0
Acanthus, or lotus leaf, 8 inches high ..	12	2	0
Ditto, 12 inches do. ..	18	4	0
Oak or laurel wreath, 6 inches diam. ..	16	2	3
Ditto, 9 inches do. ..	20	3	0
Ditto, 12 inches do. ..	28	4	0
Ditto, 18 inches do. ..	36	5	0
Per foot run.			
Egg and dart moulding, 2 inch girt ..	10	0	6
Ditto, do. 4 inch do. ..	12	0	8
Ditto, do. 6 inch do. ..	14	0	10
Rope or cable do. 2 inch do. ..	10	0	6
Ditto, round spiral column	12	1	3

Modelling ceiling flowers from 2 ft. to 5 ft. diam. will cost about 20s. per foot; the castings would be worth from 5s. to 10s. per foot diam, according to the number of pieces, &c. All ceiling flowers should be perforated for ventilation.

The price for castings include Plaster and the use of moulds made from the models, but from 2 to 25 pieces (according to value), or 50 feet of moulding are presumed to be required at these prices.

The prices of cement castings would be about two-thirds these prices.

CASTINGS IN STOCK.

Cement chimney pots 27 to 36 ins. high from 7s. to 21s.
,, balustrades, 16 to 24 ins. high, 4d. per inch.
,, trusses, 6 to 24 ins. long, 6d. per inch.
Marble cement chimney pieces with trusses prepared for graining, 35s. to 50s.
Ditto, polished white or in scagliola, 50s. to 105s

Including Models and Moulds. *Each,*	Complete. s.	d.
Ionic capital for 6 in. (major diam.) column ..	40	0
Ditto, 8 in. do.	50	0
Corinthian or Composite capital for 6 in column..	50	0
Ditto, do. 9 in. do...	60	0
Pilasters at the same rates in proportion to projection.		
Trusses and modillions enriched p. lin. inch ..	1	0
Ceiling flowers framed complete, with ventilators, ready for fixing, p. foot diam. 10s. to	15	0
Rosettes, paterae or flowers, 2 inch diam. ..	0	3
Ditto, 3 inch do. ..	0	4
Ditto, 4 inch do. ..	0	6

Per lineal foot.

Architrave enrichments, 1½ inch wide	0	6
Ditto, 2 inches wide	0	8
Ditto, 2½ inches wide	1	0
Ditto, 3 inches wide	1	4
Ditto, 4 inches do.	2	0
Ditto, 5 inches do.	3	0
Facias, friezes, &c., enriched with laurel, oak or vine wreaths, &c., 6 inches wide	3	6
Ditto, do. 8 inches wide	5	0
Cornices, with enriched friezes, &c., 10 inches wide	7	6
Ditto, do. 12 inches wide	10	0
Mouldings, in 6 feet lengths, mounted on deal 1 inch wide	0	4
Ditto, do. 2 inches wide	0	8
Ditto, do. 3 inches wide	1	0

For the cost of gilding any of the above, see page 108.

TARRING.—One gallon of tar with 1 lb. pitch will cover one square, or 11 super yards.

Coal Tar, per gallon, from 4d. to 6d.

CAULKING.—One cwt. of oakum will do 700 lineal feet of seams in 2½ inch planking, but on good work, with fine seams, half this quantity will suffice.

CHUNAM.—1 bushel fine sifted lime and 2 gallons best thin black oil, well mixed together, will be found a cheap and effectual substitute for white lead in T. & G. flooring for verandahs, &c.

Per yard super.

Labour at 1s. 4d. per hour.	Materials. s.	d.	Labour. s.	d.
Common colours, such as lead, stone, white, black, brown, chocolate, &c., once in oil, including knotting and stopping	0	3	0	5
Twice in oil, including knotting and stopping	0	5	0	7
Three times in oil, ditto	0	7	0	9
For every additional coat, add	0	2	0	2

19 lbs. of lead are required for one gallon of oil and turps together, or 1 cwt. of lead for 6 gallons of paint.

Items to be added.

Finishing coat in party colours	0	1	0	1
Flatting coat	0	2½	0	1½
Sanding	0	2	0	2
Grounds for imitations, graining, &c. ..	0	1½	0	1½
French grey, fawn, drab, salmon ..	0	1½	....	
Lilac, peach blossom, &c...	0	2	....	
Olive green, deep blue, or Indian red .	0	5	....	
Patent green, or yellow and blue verditer	0	6	....	
Lake or Chinese vermillion	1	6	....	
Imitation granite, or splashed work ..	0	5	0	2

Cleaning old work, rubbing down, or bringing forward, to be charged day work.

PLAIN MOULDINGS OR SKIRTINGS, REVEALS AND PLAIN CORNICES, HANDRAILS, NEWELS, SASH-BARS, RAINWATER PIPES AND GUTTERS.

Less than 12 inches girt or width.

Per lineal yard.	Materials. s.	d.	Labour. s.	d.
Once in oil, common colours, as above including knotting and stopping ..	0	1	0	2
Twice in oil, do. . .	0	2	0	3
Three times in oil do.	0	3	0	4
Flatting coat do.	0	1	0	1
For every extra coat, add	0	1	0	1

Per foot super.

Labour at 1s. 4d. per hour.	Materials. s.	d.	Labour. s.	d.
Once in oil, common colours, as above ..	0	1	0	1
Twice in oil, ditto	0	1½	0	2
Three times in oil, ditto	0	2	0	3
For every extra coat ditto add	0	0½	0	1
Flatting coat, add	0	0¾	0	1
MOULDINGS, or edges cut in common colours	0	0½	0	1
Mouldings picked in, or black lines ..	0	0½	0	1½
Broad ebony lines to form panels ..	0	0½	0	2
Light and shadowed lines ditto ..	0	1	0	3
Plain chimney-pieces, *each* once in oil ..	0	6	1	0
Ditto, do. ,, twice in oil ..	1	0	1	6
Ditto, do. ,, thrice in oil ..	1	6	2	0

RUBBER PAINT, composed of linseed oil, carbonate of lead, oxide of zinc, and liquid Indian rubber is a rich, smooth, glossy paint, and is said to be at least as durable as common paint, in appearance it is equal to common paint varnished; as an inside paint it is more wholesome than any (deadly) lead and oil paint could be. One gallon will cover 35 sup. yards one coat, or 25 sup. yards two coats, or 18 sup. yards three coat work.

PEACOCK AND BUCHAN'S PAINTS are noted for outside work, they are sold in 3, 7, 14, and 28 lb. tins, mixed ready for use. the price in Sydney is 72s. per cwt.

SILICATE PAINT is also noted for outside painting and is much used by the New South Wales Government for Railway Stations, &c.; it is mixed ready for use. and sold in Sydney at 50s per cwt.

IN MEASURING PAINTING, allow for all edges, sinkings, or girths. In iron railing, and other open work, it is usual to take the two sides as flat work, and ornamental or small works twice for each side including Louvre blinds or lattice work.

SASHES AND FRAMES should be measured as plain surfaces, including the glass and the exposed part of frames, with linings, &c., which should be girted; but if the squares exceed 3 super feet, then it is better to take the sash bars by the lineal yard.

Cement for stopping joints in brickwork, stonework, &c., made by mixing white lead with fine sand, is said to resist heat, cold and water.

Outside Colouring, to withstand the weather may be made by mixing Portland cement with hot water only, to a proper consistency, and keeping it stirred while using; 3 coats should be used. It is well known that pure cement is waterproof. A similar wash may be made by mixing ground or powdered free limestone, such as Oamaru or Waura Ponds stone with hot water. It will look better than Portland cement, but will not be so durable. Cold water will do but is less effective.

GILDING.

	Materials. s.	d.	Labour. s.	d.
Gilding plain work in oil gold, including preparing, per foot super	2	0	3	0
Ditto in burnished or matt gold	2	0	4	6
Bronze mouldings, not exceeding 2 ins. girt per foot run	0	2	0	3
Oil gold, half inch girt, ditto	0	1	0	3
Ditto, $\frac{3}{4}$ inch girt, ditto	0	1½	0	3
Ditto, 1 inch girt, ditto	0	2	0	4½
For every $\frac{1}{4}$ inch girt, add	0	0½	0	1½

Carved work, once and a half to twice the above prices. The present wages of Gilders are 1s. 6d. per hour.

GRAINING, &c. *Per yard super.*	Complete. s.	d.
Wainscot, or oak, combed and shadowed	1	6
Mahogany, maple, cedar, or sycamore	2	0
Satin wood, coromandel, rose wood, bird's eye maple, pollard oak, or huon pine	2	6
Yew tree, amboyna, or walnut	3	0
VEINED MARBLING, including white ground . .	2	3
Dove, bardilla, or black and gold	3	6
Sienna, brocotella, rouge royal, or green verd . .	4	6
Venetian, French, or Devonshire	5	0
Gialla, antico, oriental, verd antique, or jasper . .	6	0
Lapis lazuli, or blue and gold	7	6

If to carved work or to columns, add one-half the above prices; if to fluted columns, double them.

VARNISHING.	Materials. s.	d.	Labour. s.	d.
Spirit varnish, each coat, per yard .	0	5	0	2
Varnishing once in best copal, do. . .	0	7	0	2
Ditto, twice do. . .	0	9	0	4

	Materials. s.	d.	Labour. s.	d.
For every additional coat, add	0	4	0	2
If on the naked wood, add	0	2		
French polishing, per foot super... ..	0	1	0	6
Ditto to columns fluted do.	0	2	1	0
Ditto, to hand-rails, and small articles, per foot run	0	1	0	5
Black varnish, per gallon	9	0		

Before varnishing, the pores of the wood are filled with white size or common size, made by diluting glue to the proper consistency. For superior work after sizing, the surface is either sand-papered or rubbed over with pulverized punice-stone, which gives an even face and fills up the pores of the wood. The best French polish is mixed and rubbed in with finely powdered pumice stone; this is said to last twice as long as ordinary French polish.

White Demar Varnish is colourless, and if properly applied, looks as well as French polishing.

COLOURING (COLOUR AND SIZE.)

Per yard super.	Materials. s.	d.	Labour. s.	d.
Kalsomine, of any colour, two coats ..	0	2	0	4
Ditto, coloured ceiling	0	9	1	6
If one coat of colours in turps, add ..	0	2	0	6

KALSOMINE.

Kalsomine is a dry powder in which the size is incorporated and is now used as a substitute for whitewash and other kinds of distemper. It is sold in 5 lb. packages at 3s. per packet, and 30 packages of any colours required are packed in a case. When sold in bulk it is imported in barrels holding 300 lbs., or half-barrels of 150 lbs., and in cases of 50 lbs.

The colours are remarkably pure, of even texture, and preserve their respective tints without deterioration; they will not rub or scale off from the wall, and possess disinfecting properties. They simply require to be mixed with water before using, and are superior in every way; a 5 lb. package will make nearly a gallon, and will cover about 36 sup. yards.

Fresco Paints for bordering, stencilling, striping, &c., in boxes of half pound each, 24 boxes of any desired assortment packed in a case; the retail price varies from 2s to 3s per box.

Illustrated book circulars are issued by the Patentee, and may be had of all Decorators, giving all particulars, with 18 samples of dry Kalsomine colours, and 9 samples of Fresco paints.

Imitation Parqueterie or graining with 2 coats copal or hard varnish. Plain fret work and borders 6d. per sup. foot. Flower or scroll borders 1s. per lineal foot.

Imitation Mosaic on common plastered walls and dado, including panels with borders and angle pattern, enriched stile, &c., from 3s per sup. yard

Melbourne and Sydney prices.

Per Piece.	From s.	d.	To s.	d.
Common pulps on self coloured paper ..	0	4	0	9
Papers, white or coloured prepared grounds	1	0	2	6
Ditto, satin papers, do.	1	3	4	0
Ditto, flock do., do.	3	0	7	6
Ditto, flock and gold, do.	6	6	15	6
Ditto, gold on plain or embossed satin grounds, white or tinted for drawing rooms, &c.	3	0	8	6
Ditto, gold on plain ultramarine, emerald, crimson, &c., plain or embossed satin..	6	6	10	6
MARBLES, Sienna lined or unlined ..	1	0	4	6
Marbles and woods, superior	3	6	6	6
Lining paper, 30 inches wide	1	6	2	6
Calico or canvas lining	3	6	4	6
BORDERS.				
Per lineal yard.				
Common, from 1 to 6 inches wide ..	0	1½	0	4
Rich colours, satin, flock, plain gold, flock and gold, &c.	0	3	1	6
Corners to match, each	0	4	1	6
DECORATIONS.				
Scenes in colours, imitation engravings, &c., for fire screens or panels, per piece	2	0	10	6
Panel borders (per yard) or corners to match, each	0	2	0	3
Each.				
Ceiling centres, 15 ins. to 42 ins. diam. ..	1	0	10	0
Wall centres, cameos, &c.	2	6	10	6
Ditto, medallion views	12	6	30	0
Statuettes on brackets, stands and pedestals, Ariel figures, &c. (grey)..	3	0	12	6
Ditto do. (oak)	3	6	14	0
Columns, with caps, bases and extension, for lengthening column (grey)	5	6	8	6
Ditto, do. (oak)	6	6	11	0
Scenery in sets, from 12 to 25 lengths	£4	10 0	£21	0 0

LABOUR, *per piece.*

	s.	d.	s.	d.
Straining canvas, including tacks and slipping	1	3	1	9
Hanging lining paper	1	0	1	3
Ditto common or satin paper	1	0	1	3
Ditto flock	1	4	1	9
Pumicing lining paper	0	2	0	3
Hanging borders, per dozen yards ..	1	0	1	6
Sizing, 2 coats, and varnishing marble paper	2	0	3	0
Ditto, do., and twice varnishing	3	0	4	0
Extras.				
Hanging horizontal papers	0	3	0	4
Ditto, do. Sienna in separate marble blocks and lining to imitate stone work	0	9	1	0
Ditto, ordinary decorations	3	0	4	0

For superior decorations no prices can be quoted, since the cost of hanging entirely depends on the design and the number, size, and shape of the panels.

A piece of paper is 36 feet long by 21 inches wide, and contains 63 sup. feet, or 7 sup. yards, but the ends are generally injured by packing, exposure, unrolling, &c.; in papering there is also a further waste in matching the ends according to the size of the pattern; an allowance must therefore be made from 5 to 9 super feet, in calculating the number of pieces required for a given area, after deducting the openings Any portion of a piece required is charged as a whole piece.

N.B.—The labour on the above is reckoned at from 1s. 6d. to 1s. 9d. per hour for Paperhangers, and from 1s 9d. to 2s. per hour for Decorators.

DEAL MOULDINGS. *Including fixing per lineal yard.*

	½ in.		¾ in.		1 in.		1¼ in		1½ in		1¾ in		2 in		2½ in	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Black polished	0	5	0	7	0	9	0	10	1	0	1	1	1	4	1	9
Black and gold	0	8	0	11	1	2	1	6	1	8	1	10	2	2	2	9
Gold	0	11	1	1	1	7	2	1	2	4	2	7	2	11	3	9

PAPIER MACHE centre flowers not fixed from 5s. to 7s. per foot diameter.

BRASS white and gold ditto from 10s. to 20s. ditto.

For fixing add from one-fourth to one-third,

Per letter per inch in height.	s.	d.
Plain painted letters, 1 to 4 ins.	0	1
Ditto, 4 to 8 inches high	0	¾
Ditto, 8 inches and over	0	½
Egyptian or sunk letters	0	2
Gold, plain or bronze, with gilt edges	0	4
Ditto, Egyptian or sunk	0	5
If shaded, add..	0	1
Double ditto, add	0	1
If to imitate projecting letters, add	0	2
Writing on glass, plain burnished gold, with two shades, on coloured ground	0	6
Ditto with three shades, ditto	0	8
Embossing and gilding ornamental letters with two shades, on coloured ground	1	6

For German text, old English, ornamental or ancient writing, add 50 per cent. to tne above.

GLAZIERS' WORK.

FANCY GLASS, &c., MELBOURNE AND SYDNEY.

16 oz. *per foot super.*

	s.	d.		s.	d.
Blue purple or amber	1	3	Embossed borders, p. l.		
Ruby and green ..	1	4	foot	1	11
Blue or ruby embossed	5	0	Brilliant cut corners		
Ornamental glass ..	1	0	from 4 to 6½ in. sq.		
Ditto stained	1	9	per set of four ..	5	0
Obscured glass ..	0	9	Ditto rosettes, per set	4	6
If embossed to order,			Glazing and putty extra		
from	3	0	per foot	0	2

PATENT PLATE GLASS.

In squares for glazing.

From 14 oz to 21 oz. is mostly used for glazing pictures and for photographic purposes.

21 oz. = 1-10th inch per foot super.

Up to 6 sup. feet 3s. 3d. From 6 to 12 sup. feet 3s. 6d.

3-16 and ¼ in. thick per foot super.

	s.	d.		s.	d.
Up to 10 feet super	3	0	From 40 to 60 feet sup.	3	6
From 10 to 20 feet	3	2	60 to 70 feet ,,	4	0
20 to 40 feet	3	4	Add 6d. per foot for glazing.		

This glass can be obtained up to 156 x 118. but special prices must be obtained for each order.

Embossed plate glass to order, or stained glass in quarries from 7s. to 11s.

FLUTED OR ROLLED PLATE GLASS.

For Conservatories, Hot-houses, skylights, &c.

Per foot super.

26 oz. ⅛ inch up to 20 feet super, 10d., 32 oz. 3-16 inch to 20 feet super, 1s. 1d. Glazing 3d. per foot extra.

¼ inch thick, 1s. 3d. per foot, or 1s. 6d. glazed.

ROUGH CAST OR HAMMERED PLATE GLASS.

	s.	d.		s.	d.
⅜ inch up to 20 ft. sup.	2	6	¾ inch up to 20 ft. sup.	5	0
½ inch do.	3	0	1 inch do.	6	0

Rough cast glass is used in floors to give light to spaces that cannot be otherwise lighted. Its strength is greater than granite when subjected to a transverse strain. It is as slippery as ice; but this disadvantage might be neutralized by using it in small squares or quarries set or fixed in a raised iron frame.

Prismatic lights, for illuminating basements, cellars, &c., are also sold in Melbourne and Sydney.

SHEET GLASS CUT TO SIZES.

Thirds per foot super., including waste.

From	To	16 oz. s.	16 oz. d.	21 oz. s.	21 oz. d.	26 oz. s.	26 oz. d.	32 oz. s.	32 oz. d.
0 sup. ft.	4 sup. ft.	0	3½	0	7	0	9	1	0
4 ,,	8 ,,	0	4	0	8	0	10	1	1
8 ,,	12 ,,	0	4½	0	9	1	0	1	2
12 ,,	16 ,,	0	5	0	10	1	1	1	3
16 ,,	20 ,,	,,	,,	0	11	1	2	1	4

Add 2d. per foot super for glazing and putty.

The above prices are given as the cost of small quantities of work For large quantities it will be cheaper to purchase sheet glass by the 100 feet super. The present prices are for,

16 oz. glass by the square (or 100 super feet) = 16s for a pane about one foot super, to 35s. for sizes up to 12 feet super.

21 oz., 40s. for sizes of about 6 sup. feet to 75s for sizes up to 16 sup. feet.

26 oz. glass, 55s. to 91s. for sizes similar to the 21 oz. glass.

Painting and Glazing.—It will be found that the cost of glazing and putty for ordinary-sized glass, added to the cost of painting the sashes 3 coats in oil colours on both sides, will be about equal to the cost of the glass, if not thicker than 16 oz.

Obscured or ground plate is made up to 156 ins. by 96 ins., price 6d. per foot more than polished plate glass.

Polished chequered plate for banks, public buildings, &c., size up to 80 ins. by 50 ins. price per foot super, about 5s. 6d.

Rolled quarry plate $\frac{1}{8}$ in. = 2s., 3-16 in. = 2s. 3d, and $\frac{1}{4}$ in = 2s. 6d. suitable for schools, churches, door panels, &c., sizes up to 96 in. x 32 in. If tinted 3d. per foot extra.

Glass bending and the construction of stained and ornamental glass windows are now successfully carried out in Australia, the designs and execution being equal to similar imported articles.

Diamond rolled plate, $\frac{5}{8}$, 3-16, and $\frac{1}{4}$ in, thick, in different tints, up to 90 x 64, price per foot super. for $\frac{1}{4}$ inch is 1s. 6d.

Rough cast chequered plate in blue and white, $\frac{1}{4}$ in. thick, sizes up to 90 x 50, suitable for door panels, &c., prices per sup. foot for white 2s. 6d., coloured 3s.

Cathedral rolled plate, all tints, $\frac{1}{8}$ and 3-16 in. thick, sizes up to 90 x 32 for quarry glazing, &c., per foot super., 1s. 6d.

Silver plate glass made up to 120 x 60 (by the patent process), used for bar and shop fittings, fancy shops, &c., price per foot super. up to 2 ft. 3s , 6 ft. = 3s. 6d., 10 ft. = 4s. 6d., 20 ft. = 5s., 30 ft. = 5s. 8d., 40 ft. = 6s., 50 ft. = 6s. 6d., 60 ft. = 7s., 70 ft. = 7s. 6d., 80 ft. = 9s., per foot super.

Mem.—As the whole of the glass used here is imported, the variation in price from year to year is trifling, unless from local competition.

PATENT LEAD PIPES.

Per lin. yard, at 23s. 4d. *per cwt., or* 2½d. *per lb.*

Diameter. inches.	LIGHT.			MEDIUM.			STRONG.			Soldered joints, each.	
	lbs.	s.	d.	lbs.	s.	d.	lbs.	s.	d.	s.	d.
½	3	0	7½	4½	0	11¼	6	1	3	2	0
¾	6	1	3	7	1	5½	9	1	10½	2	6
1	8	1	8	10	2	1	12	2	6	2	9
1¼	10	2	1	12	2	6	16	3	4	3	0
1½	12	2	6	16	3	4	20	4	2	3	3
2	18	3	9	24	5	0	30	6	3	3	6

If 18s. 8d. per cwt. or 2d. per lb. deduct one-fifth.

COST OF LAYING SERVICE PIPES.

	£	s.	d.
Say 20 yds. ¾ inch patent lead pipe, as above, for high pressure, at 1s. 10½d. per yard	1	17	6
Labour in laying down pipe, including opening ground, boring main, cutting through and making good to walls, floors, &c, 20 yds. at 1s. 3d. per yard	1	5	0
Say 5 joints, at 2s each, as above	0	10	0
¾ inch Stop-cock, 6s. ; Bib-cock, 6s.	0	12	0

By altering the above as required, any estimate may be made for any length or size pipe, &c., the labour in laying down being about the same for any ordinary size pipe, either lead or iron.

For prices of black and galvanized iron pipes see page 118.

Medium pipe is generally used in Sydney, but *Strong* pipe in Melbourne, on account of the greater water pressure from the Yan Yean Reservoir.

On account of the poisonous nature of lead pipe, it is rarely used in Melbourne or Sydney for water supply, except for awkward bends and other exceptional cases, but it is always used to connect the gas mains with the metres, even the *strong or thickest lead pipe* is commonly used in Sydney for gas metres, although the thinnest, or light lead pipe would be more than strong enough.

Galvanized Iron Pipes, with screwed ends and T. pieces or square junctions, bends or quadrants and angle, junctions or springs, from 30 degrees to 60 degrees, are generally used for water supply up to 3 ins. bore. Above this size they are mostly coated with coal pitch varnish.

Black or common wrought Iron Pipes up to 3 ins. bore are always used for gas, and corrode or oxidise inside less than gal. iron pipes.

Including solder, hooks, nails, &c., per cwt.	s.	d.
Laying gutters or flats, or lining cisterns	4	0
Ditto hips or ridges, or lining small cisterns, &c.	5	0
Ditto step and apron flashings	7	0
Ditto, hips, ridges, flashings, &c., to dormers or turrets	8	0
Add for every 10 feet above 30 feet high	0	6

The width of valley and wall gutters should be in proportion to the quantity of water they have to carry. This is not much attended to, hence we have 8 inch turn-ups and gutters 2 feet wide where half these measurements would be ample, *the water will pass under the lead if it rises above the drips.*

Sheet Lead in rolls per cwt.	s.	d.
3, 3½, 4, 4½ 5, and 6 lbs. per sup. foot	18	0
Ditto do. if cut to sizes	20	0
Scrap lead or pig lead for jointing pipes, &c.	14	0

FORCE AND LIFT PUMPS. *Each.*

American brass force and lift pumps on planks

2 in.	2½ in.	3 in.	3½ in.	4 in.
£6	£6 10	£7 10	£8 10	£10

Douglas' American lift pumps

Nos.	1	2	3	4	5	6
	18s.	20s.	21s.	23s.	27s.	32s.

CAST IRON SPOUTING, &c.

Per lineal foot, in 6 feet lengths.

	2½ in.	3 in.	3½ in.	4 in.	4½ in.	5 in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Spouting, O.G.	...	...	...	0 8	0 9	0 10
Ditto, half round	...	...	0 5	0 6	0 7	0 8
Down pipes	0 9	0 10	0 11	1 0	1 1	1 9
Heads, each	3 6	3 9	4 0	4 6	...	6 0
Shoes, each	2 6	2 9	3 0	3 6	...	5 0
O.G. angles, each	...	...	...	3 0	3 3	3 6
Half round angles each	...	2 9	3 0	3 3	...	...
Clips, each	...	...	0 9	0 10	0 11	1 0
Nozzle pieces, each	...	...	...	2 3	2 6	2 9

For weight of the above see Weight of Building Materials.

No. 26 gauge, per foot run.

Size. inches.	Down Pipes.	Half round slip jointed.	O.G. gutters.	Heads each.	Shoes each.	Angles for gutters ½ round.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
2	0 3½	.....	.....	2 3	0 9	.....
2½	0 4	.....	.....	2 6	0 10	.....
3	0 4½	.....	.....	2 9	0 11	.....
3½	0 5	.....	.....	3 0	1 0	.....
4	0 6	0 3½	0 4	3 3	1 1	1 6
4½	0 7	0 4	0 4½	4 0	1 3	1 9
5	0 8	0 4	0 5	4 0	1 4	2 0
6	...	0 5	0 6	.....	.....	2 3

This piping ought to be made with 24 or even 22 gauge, gal. iron, the 26 gauge being altogether too flimsy ; 24 gauge spouting, if made by hand, would be about 50 per cent. dearer, but were it brought into general use, the extra price (machine made) would not exceed one-fourth more, although it would last at least twice as long. The half round spouting of 26 gauge is almost worthless, and soon runs into *festoons*, being unable to support its own weight ; the horse-shoe eaves spouting is much stronger, and may be made by simply bringing the sides of half-round spouting closer together ; the O.G. spouting of 24 gauge, with a fillet at bottom, is handsome and durable, if of 22 inch gauge the better ; cast iron spouting is scarcely used in Sydney, although far superior to the thin gal. iron spouting.

Per dozen.

Spikes and tubes 2s. 3d. ; Down pipe hooks 2s. 6d. to 3s. Brackets 3s. to 4s. 6d.

GAL. IRON.—RIDGE CAPPING.

26 gauge	12 ins.	14 ins.	15 ins.	16 ins.	18 ins.
	4d.	4½d.	5d.	5½d.	6d.
24 gauge	5d.	6d.	7d.	8d.	9d.

In measuring eaves gutters, for every angle reckon 3 feet extra of gutter, or else add the price of the angles separately.

Ridge capping should be at least 24 gauge, 22 gauge would be better still, although less than one-third the weight of 4 lbs. lead.

Painting.—Gal. iron will last at least 7 years without painting. If painted, non-poisonous paints should be used if the rain water is utilized for drinking purposes. Lead paint is highly poisonous, causing paralysis, &c.

REVISED LIST OF WROUGHT IRON GAS, STEAM, AND WATER TUBES AND FITTINGS.

Adopted by the Iron Tube Trade, Birmingham, May 25th, 1871. Accepted by the Trade of Melbourne, Sept. 1, 1871,

INTERNAL DIAMETER ...	⅛	¼	⅜	½	¾	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3½	4
TUBES.	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*	*s. d.*
Tubes, from 2 to 14 ft. long...pr. ft.	0 2½	0 3	0 3½	0 4½	0 6	0 8	0 11	1 2	1 6	1 9	2 6	3 3	4 0	4 6	5 6	7 0
Long Screws 12 to 23 ins. ... each	0 5	0 7	0 9	0 11	1 2	1 6	2 0	2 6	3 3	4 0	5 6	7 0	8 6	10 0	12 6	15 6
Bends ... ... „	0 5½	0 6½	0 7	0 8	0 11	1 3	1 9	2 3	3 3	4 3	6 6	10 0	12 0	16 0	25 0	32 6
Springs, not socketed ... „	0 4	0 5	0 6	0 7	0 9	0 11	1 4	1 8	2 6	3 3	5 6	7 6	10 0	12 0	19 0	26 0
FITTINGS.																
Elbows wrought iron ... each	0 6	0 6½	0 7	0 8	0 10	1 2	1 9	2 3	3 0	3 6	5 6	8 6	11 0	14 0	22 0	28 0
Tees ... ... „	0 6	0 6½	0 7	0 9	1 0	1 3	1 9	2 6	3 0	3 9	6 0	9 6	12 6	16 6	24 0	30 0
Crosses... ... ... „	0 10	1 0	1 0	1 5	1 9	2 3	3 0	3 6	4 6	5 3	10 6	16 0	21 0	30 0	42 0	50 0
Plain sockets ... ... „	0 1½	0 1½	0 2	0 3	0 3½	0 4	0 6	0 7	0 9	1 0	1 6	2 6	3 0	3 6	5 0	6 0
Diminished Sockets ... ... „	..	0 3	0 4	0 5	0 6	0 7	0 9	0 11	1 1	1 3	2 0	3 0	4 0	5 0	7 0	9 0
Flanges ... ... „	0 8	0 9	0 10	1 0	1 2	1 4	1 6	1 9	2 0	2 6	3 9	5 0	6 9	8 6	10 0	11 6
Caps & Plugs... ... ... „	0 2	0 3	0 3	0 4	0 5	0 6	0 8	0 10	1 0	1 3	2 0	2 6	3 6	4 9	7 0	10 0
Backnuts & Nipples ... „	0 1	0 2	0 2	0 3	0 3½	0 4	0 6	0 8	0 10	1 0	1 9	2 3	3 0	3 6	4 6	5 6
Round Elbows ... ... „	0 7	0 7	0 8	0 9	1 0	1 4	1 11	2 6	3 4	3 10	6 6	10 0	13 0	16 0	25 0	32 0
Iron Main Cocks ... ... „	2 3	2 3	2 9	3 6	4 6	6 6	8 6	11 0	14 0	18 0	27 0	36 0	44 0	50 0	75 0	90 0
Ditto, with Brass Plugs ... „	..	..	4 6	5 6	7 6	10 6	15 0	19 6	25 0	32 0	47 0	60 0	..	110 0	140 0	190 0
Round-Way Iron Cocks ... „	..	..	3 6	4 0	5 6	7 6	10 0	13 0	17 6	22 0	38 0	54 0	62 0	70 0	100 0	160 0
Ditto, with Brass Plugs ... „	..	..	5 0	6 6	9 0	13 0	19 0	28 0	36 0	42 0	60 0	85 0	105 0	120 0	180 0	280 0

N.B.—The present prices in the Australian cities are one-half the above for black iron, and one-fourth less than he above for galvanised iron.

	£	s.	d.
Tylor and Son's patent closet apparatus ..	3	10	0
Syphon trap of 8 lbs. lead for do.	0	15	0
Patent closet apparatus complete, from £4 to	7	0	0
12 inch blue and white W.C. basin 7s. 6d. to	0	9	0
4 inch lead soil pipe from pan per lin. foot ..	0	4	0
4 inch lead bend to match each	0	8	0
Copper self-acting ball cock	0	10	6
Water closet valves	0	7	0
New tinned copper basin..	0	5	0
Brass crank and lever	0	5	0
Doultons and Co.'s enamelled stoneware registered closet pans, with improved syphon ..	0	15	0
Delf ditto, with ditto	1	0	0
Wash basin, with overflow holes, 14 ins. diam.	0	12	0
Ditto, do. 16 ins. do.	0	16	0
W. C. Cistern (as adopted by the Sydney Corporation) of 24 gauge gal. iron, copper ball tap or water waste preventer, glazed earthenware pan and trap with 1½ in. gal. iron down pipe from cistern complete	3	10	0
Wrought iron 1½ inch pipe from bottom of copper boiler with brass stop cock and key...	1	10	0
Pine cistern lined with lead supply pipe and bib cock overflow, &c., complete	4	0	0
Urinals, earthenware, and trap with tap, supply, with stop cock and waste pipe	3	0	0
Ditto, self-acting with treadle water waste preventor	5	0	0
Single hydrants for water supply	6	0	0
Double ditto do.	7	0	0

As urine has a much greater affinity for iron than for earthenware, waste pipes of glazed earthenware are preferable to iron or lead.

The third item gives the range of prices for the great variety of closet apparatus imported. The chief makers are Hayward, Tylor and Sons, Lambert and Sons, and Warner and Sons.

Force and lift pumps are made in Melbourne at or less than the prices for imported pumps.

Tylor and Son's Lavatory Apparatus.

	£	s.	d.
Patent "flushing rim" lavatory apparatus, self-cleansing, quick emptying, for marble enameled slate or cedar top, with hot and cold water, and waste, pull-outs, &c., complete	5	0	0
Patent flushing rim lavatory basin, of white earthenware .. .. .. 12s. to	1	1	0
Ditto, marbled or handsome pattern 16s. to	1	4	0
Ditto, white and gold lines .. 23s. to	1	14	0
Extras.—Porcelain plates, lettered "cold," "hot," "waste," 8s.; horn knobs for ditto ..	0	8	0
,, Vein marble slab, 2 ft. 9 in. by 2 ft. (skirting extra)	3	15	0
,, Enamelled slate ditto do. ..	3	3	0
,, Silvered plates and basin connection	0	10	0

PATENT PARAGON EARTH CLOSETS.

	£	s.	d.		£	s.	d.
Deal closets complete, with pull action	3	10	0	to	4	15	0
Cedar ditto do do ..	5	15	0	to	6	10	0
Deal double action self-acting earth closets	4	5	0	to	5	10	0
Cedar ditto do do ..	6	0	0	to	6	15	0
Lead urinal shoots fitted to the above					1	0	0
Galvanized iron ditto					0	10	0

GAS FITTER.

Laying on Gas viz. :—

	£	s.
Connecting with meter, including all necessary cocks, iron and tin pipes, or tubes fixed to receive gasaliers, at per room	1	10
If over 10 outlets, at per room	1	5

N.B.—Fittings, gasaliers, &c., generally supplied or chosen by the proprietor. The Gas Company supply and lay 20 feet of service pipe from the main to meter.

In laying gas-pipes through floors, the centre of the joists should not be cut away, because the joists are weakened in proportion to the depth cut away, whereas the ends of the joists (to one-eighth of the span) may be cut away to one-third of their depth, or at one-quarter of the span to one-sixth of their depth, without in any way weakening them. Pipes that are enclosed in walls ought to be tested by the meter before they are rendered inaccessible, or the escape of gas may become a nuisance and even dangerous.

Block tin gas tubing, about 5 feet to the lb., at per lb. 1s. 6d.

Compo. (lead and tin) tubing is not allowed for gas connections.]

	£	s.
Cooking Stoves, Jean's patent gas cooking stoves, for family use		
Size No. 0, viz., 22 ins. high, 11 ins. wide, and 9½ ins. from back to front, complete with pan and gridiron	3	5
Size No. 1—24 ins. high, 15 ins. wide, and 12 ins. from back to front, complete with pan, &c.,	4	15
Size No. 1½—28 ins. high, &c., size between No. 1 and 2, complete	5	10
Size No. 2—30 ins. high, 18 ins. wide, by 14½ deep, with 4 atmospheric burners for boiling ..	7	0
Size No. 3—34 ins. high, 19½ ins. wide, by 14 ins. deep, with 6 burners for boiling	11	0
Leoni's best London made *strong wrought iron* gas cooking range, lined with tiles, to cook for 50 persons	27	0
Jean's exhibition gas stove, to cook for 150 persons, with two ovens and boilers, plate warmer, &c., on view at 73 Market-street, Sydney ..	30	0
Gas stove for laundries, offices, parlors, bedrooms, nurseries, &c. .. .. .. from £2 to	3	10
Doctor's or Chemist's lamp, with bulls eye coloured glasses, writing, &c. .. from £3 10s. to	5	0
Vapor baths for invalids, heated by gas	5	0
Bath pillows for ditto	1	1
Baths for schools, &c., heated by gas in 20 minutes (Jean's patent)	15	0
Patent portable water heater (heated by gas) by which a hot bath can be obtained in a few minutes at a small cost .. from £5 10s. to	8	0

	£ s.
Asbestos stoves for drawing rooms, bedrooms, offices, &c., heated by gas, and noted for cleanliness and economy, fitted up complete, per stove	£4 10s to 6 0
Gas engines for working lathes, coffee mills, jig saws, and light joinery	from 120 0
Marshall's *Portable gas works* for tallow gas (suitable for country mansions, hotels, &c.), with fittings complete	from £42 to 195 0
Approximate cost of fixing	from £5 to 35 0

Capacity of gasholders from 60 to 1500 cubic feet.

NOTE.—Seven pounds of tallow will make 100 cubic feet of gas, each burner consuming 1½ cubic feet per hour, as compared with 4 cubic feet of coal gas.

Gasholders of 500 cubic feet and upwards require to be built into a circular brick tank, a specification of which is supplied with the apparatus.

GAS METERS.—*Each.*

3 light.	5 light.	10 light.
£2 10s.	£3 5s.	£4 10s.

The metres are always supplied and fixed by the Gas Companies, but these are the average prices. There are also 15, 20, 25, 30, 50, and 100 light or station meters.

GASALIERS, &C.—*Each*

Single light gas brackets, from ..	£0	3	6	upwards.
Double jointed ditto, do. ..	0	6	0	,,
2 light water joint gasaliers do. ..	2	0	0	,,
3 ditto ditto do. ..	3	0	0	,,
4 ditto ditto do. ..	6	0	0	to £18.
5 light gasalier do. ..	9	0	0	upwards.
6 ditto do. ..	12	0	0	,.

Labour in laying or fixing and jointing gas pipes from 4d. to 6d. per lineal foot, according to quantity.

BATHS (*hot and cold*).

	£ s. d.
High pressure boilers for kitchen range to supply hot water	from £7 to 10 10 0
Cost of setting same	from £3 to 4 10 0
Cedar baths lined with lead and fitted with shower tap and waste pipe, hot and cold water appliances complete	15 0 0

	£	s.	d.
Cedar baths, lined with no. 24 gauge gal. iron, full size, with square or oval ends, fitted complete .. .. £10 to	12	0	0
Turkish shower most approved, fitted to same	12	0	0
Hot and cold water cisterns to supply bath, lavatory, kitchen and wash house	10	0	0
Wash-hand basin fitted with hot and cold water, exclusive of pipes .. .. .. from	5	0	0
Galvanized iron bath, 24 gauge, each	2	5	0
Plug and washer, with chain	0	3	0
Copper shower and stop cock for same	0	17	6
Cold water tap and hot water tap	1	2	6
Turk's head, zinc faced shower, fitted	1	10	0
Slate Bath, full size, including waste and overflow pipes with fly nuts and unions for lead connections	15	0	0
Marble Baths, full size with brass connections for supply, waste, and overflow pipes ..	20	0	0
Enamelled Iron Baths, fitted with pipes, &c., complete .. .. £15 to	20	0	0
Porcelain Bath, with all connections in ornamental brass, and pipes complete	25	0	0

WATER METERS.—*Each.*

½ in.	¾ in.	1 in.	1½ in.	3 in.	4 in.
£4 10s.	£5 10s.	£6 10s.	£10.	£20.	£25.

PUMPS AND WATER LIFTERS.

McCOMA'S WATER LIFTERS.—These water lifters are an improvement on the Californian pump; they are simple, durable, efficient, and economical, and might be used to great advantage in lifting waters from foundations, shafts, cuttings, tanks, &c., in course of construction, as they can be erected, lengthened, repaired or removed by any mechanic.

Their power may be estimated from the fact that—

ONE MAN can raise 3600 gallons per hour, 15 feet high.

ONE HORSE can raise 27,000 gals. per hour, 10 ft. high

Inch Pore.	Power and Height.	Quantity.	Price with frame.
2½	One man, 15 feet	3,600 gals. per hour	£18
3½	Two men, 12 feet	7,200 ditto	£24
5	One horse, 20 feet	18,000 ditto	£44
7	One horse, 8 feet	48,000 ditto	£48
5	Portable complete	30,000 ditto	£130
7	Ditto	70,000 ditto	£150

These water lifts may be obtained in Melbourne or Sydney.

Tylor and Son's contractors' wrought iron pump, from 4 to 9 ins. diameter, with 10 feet of piping, from £6 to £15.

Galvanizing extra, from £1 to £2. These pumps are made 14 feet in one length, or in shorter lengths, which are put together with bolts and nuts for convenience of shipment. An extra length, 8½ feet long, for sliding suction with funnel-shaped head, which is luted with clay, to make the joint or connection with pump, and can be lowered as required without unfixing any part of the pump. The extra cost of same is from £3 for a 4-inch, to £5 for a 9-inch pump; if galvanized, from 10s. to 30s. extra. The pumps and extra piping are perforated at lower end, to prevent stones, &c., getting into them.

Warner's best 3½ inch brass barrel force and lift pump with air vessel and delivery tap to supply yard cistern and house, including 100 feet of 2 inch and 1½ inch galvanized iron pipe, taps, connections, &c., complete, £25.

Lift pump (4 inch) for house work, fixed in yard, with 15 feet gal. iron pipe, from £2 10s. to £4.

Wheel and pinion gear with cast iron frame, £12.

Centrifugal Pumps.—These pumps, like the Californian pump and McComa's Water Lifter will raise water mixed with sand or clay without injury to the pump. They are made to work in a horizontal or vertical shaft with a pulley and endless band.

Suction pipes with elbow and foot valve, also extra shafting can be had with pumps.

They will raise from 100 to 4000 gallons per minute, with from one to 40 horse-power, and cost in Melbourne or Sydney from £6 to £58 each.

HYDRAULIC RAM.—No. 4 size, requiring a water supply of from 2 to 8 gallons per minute, with discharge pipe, ½ in. bore £4.

This is the most simple and effective machine for forcing a continuous stream of water by gravitation to a considerable altitude, saving the power required in using a force pump. It will work with even 18 inches fall of water and does not easily get out of order.

ZINC WORK.

Weight and price at per foot super. and per square.

No. of zinc gauge.....	8	9	10	11	12
Corresponding No. of Bir. wire gauge.....	26	25	24	23	22
Ounces per super. foot...	9¾	10¾	13	15¼	17½
Pence p. foot sup. at 4d. per lb....	2½	2¾	3¼	4	4½
Lbs. per square without laps.....	61	68	82	96	109
Weight of sheets, 7ft. x 3ft., in lbs	13	14½	17	20	22¾
Price of sheets at 4d p lb.	4s 4d.	4s. 9d	5s. 8d	6s. 8d.	7s. 7d.

Vielle Montagne Zinc in sheets 4 ft. by 2 ft. is imported up to ⅜ inch thick and sold at 42s. per cwt. It is made up to ¾ inch thick.

The present prices of No. 8, 9, and 10 zinc sheets is 30s per cwt.

Perforated zinc, No. 9 or 10 gauge, for safes, larders, ventilators, &c., per sup. foot ... ... 0s. 7d.

Ditto by the sheet, do... ... ... 0s 5d.

MEM.—If sheet zinc contains any *iron* in its composition, it will not resist the action of the air, and is no better than damaged or inferior galvanized iron. It is essential that it should be perfectly malleable, or it will crack with too sudden changes of temperature; the best test of its malleability is to double the corners backwards and forwards, which ought not to crack it.

Care must be taken to allow for *contraction and expansion* which may be effectually guarded against if properly laid.

Good sheet zinc forms an excellent *cheap substitute* for lead or copper in the lining of tanks, cisterns, urinals, gutters, or for covering ridges, hips, flats, &c., and is largely used on the Continent of Europe.

Galvanized iron (No. 24 gauge) valley gutters were used in the King-street, Arcade, Sydney. They are about 18 ins wide, with regular fall and no drips, the down pipes being at short intervals; the sheets were soldered together in one length of about 80 feet,

which is not secured so that it can expand; the flashings are also of galvanized iron. Gal. iron valley and wall gutters are said to be common in Queensland.

THE LABOUR TO ZINC and galvanized iron is about the same.

CAST ZINC

Corinthian capitals for 3 inch wood or iron columns, cast hollow and secured to top of shaft, each 5s. 0d
Castings in zinc or white metal, if moulds are in stock, p. lb 0s. 7d.

VULCANIZED INDIA RUBBER DELIVERY HOSE.

Three ply per lin. foot.

½ in.	⅝ in.	¾ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 in.	2½ in.	3 in.
s. d	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
0 9	1 0	1 3	1 6	1 7	1 10	2 2	2 4	2 10	3 4

TUBING FOR GAS —*Per foot.*

Internal diam.	¼ in.	⅜ in.	½ in.	⅝ in	¾ in.	⅞ in.
	s. d.	s. d.	s. d.	s. d.	s d	s d.
Vulcanized ..	0 5	0 7	0 8	0 9	0 10	1 2

Washers or joints for gas and water pipes, *per lb.*,

¼ in. thick 3 in.	4 in.	5 in.	6 in.	8 in.	10 in.	12 in,
s d.	s. d.	s. d	s d.	s. d.	s. d.	s. d.
Ditto each 0 4	0 5	0 6	0 7	0 10	1 2	1 4

Sheet Rubber, from 1-16th to ½ in. thick, and 3 or 4 feet wide, *per lb.* from 3s. to 5s.

Vulcanized or mineralised India Rubber weighs from 6 to 9 lbs. per super: foot 1 inch in thickness; this diversity in the weight is owing to the quantity of sulphur incorporated, which varies according to the purpose for which it is applied. The North British Co.'s goods are about the best in the markets.

BELL-HANGING with porcelain dado, levers, zinc tubing, No. 17 gauge copper wire, cranks, and bell, complete per pull, from 30s. to 35s.

ELECTRIC BELLS.—*Presses* (not less than four) will cost from 35s. to 50s. each, according to qualities and difficulties to be overcome. These prices include indicator, batteries and bells complete. It will be seen from the above that the electric bells will cost at least from £7 to £10 when applied to any building.

DIVING APPARATUS complete in Melbourne or Sydney, from £135 to £175.

Two men can work the air pump to a depth of 51 feet.

In a diving bell men can work for several hours at this depth under a pressure of 37½ lbs. per square inch. At a depth of 90 feet they can work only for about 1 hour without seriously suffering from paralysis.

Iron cylinders for bridges, wharves, &c., are sunk by Triger's *plenum process*, which consists in forcing air into the cylinder to such an extent as to force out the water below the bottom of the cylinder, leaving the earth or soil nearly dry; the men pass in and out of the cylinder by an *air lock*, which is generally of the same diameter as the cylinder, and about 6 feet high; it is secured to the top of the cylinder, and is fitted with air-tight valves at top and bottom, through which the men pass. These men are entirely at the mercy of those employing them, and may be injured for life by paralysis, caused by working too long, or at too great a depth. The laws relating to the supply of air, &c., are similar in their results to those relating to the diving dress and diving bell. The iron cylinders of the Darling Harbour Wharf, Sydney, and Parramatta River iron girder bridge, near Sydney, were sunk by the *Plenum process*. See "Trautwine's Engineer's Pocket Book."

METAL WORK.

	s. d.	s. d.
Brass castings, per lb.	1 6	to 1 8
Cast copper cramps, or other castings, p. lb	1 4	to 1 6
Sheet and bolt copper do..	1 4	
Copper tubes, $\frac{1}{8}$ inch thich, as below, p. lb.	1 6	to 1 9
MUNTZ METAL, per foot sup., 16, 18, and 20 oz., sheets 4 ft. by 14 ins. per lb ...	0 7½	to 0 9
Ditto, bolts and straps at Sydney, per lb.	0 11	to 1 0

ELECTRIC TELEGRAPHS.—*Per mile.*

	£ s.
Erecting iron poles and one wire (labour only) near Sydney or Melbourne	5 0
Fixing extra wire on ditto	1 7
Ditto, stays and struts extra, each	0 5

Wooden telegraph poles will cost about the same as the timber for rough timber bridges, with the cartage added. See page 65

LIGHTNING CONDUCTORS.

Copper rope, 7 ply, from quarter inch to $\frac{5}{8}$ inch diam., or copper bands $\frac{5}{8}$ in to 1 inch wide, by $\frac{1}{8}$ inch thick will cost from 2s. to 3s. per foot, including fixing and connecting gal. iron, or lead ridge, or hip capping, or iron eaves spouting, or the roof generally if of iron. Points, terminals and earth plates of copper, are included in the measurement.

The earth plate is about 30 ins. by 15 ins. wide, and not less than 1-16th inch thich ; it is inserted in *damp* earth, not less than 7 feet deep, unless rock intervenes sooner, when the copper wire is spread out in all directions from the plate, which is generally surrounded with charcoal, because it attracts the moisture from the soil. It has been ascertained that a lightning conductor will protect an area not exceeding the square of its height.

Copper is the best practical conductor, and when applied in the above form with *bright points*, free from oxide or gilded with several coats of gold leaf—it will be more effective. The next best conductors are copper tubes $\frac{1}{8}$ inch thick, as follows :—

	in.	in.	in.	in.	in.	in.	in.	in.
External diam. ...	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{3}{4}$	2
Lbs. per lin. foot ...	0.94	1.14	1.33	1.51	1.69	2.08	2.42	2.87

In using copper tubes or hollow balls it is necessary that all points of junction or contact should be sweated or soldered so that the inside cannot be impaired by dust or dirt.

Caution.—The demand for copper lightning conductors is so great that a spurious iron wire is tinted throughout its substance so as to resemble copper even when cut into. The best copper contains only 2 per cent. of foreign matter, and is therefore practically pure.

Galvanized wrought iron piping with screwed ends might be used with a saving, but its efficiency or conducting power is at the most only one-third that of copper. Dr. Matthieson, in treating of voltaic batteries, gives it as about one-sixth. In any case it is necessary that the points, terminals and plates should be of copper, and the above conditions strictly attended to in order to ensure attraction and isolation.

COPPER BOILERS.

Diagonal Length from Lag to Brim ; that is from Top of Rim to the Bottom Edge.

Inches.	Gallons.	lbs	Inches.	Gallons.	lbs.
$9\frac{3}{4}$	1	$1\frac{1}{2}$	21	10	15
$12\frac{1}{2}$	2	3	$21\frac{1}{2}$	11	$16\frac{1}{2}$
14	3	$4\frac{1}{2}$	22	12	18
$15\frac{1}{2}$	4	6	$22\frac{1}{2}$	13	$19\frac{1}{2}$
$16\frac{1}{2}$	5	$7\frac{1}{2}$	$23\frac{1}{2}$	14	21
$17\frac{1}{2}$	6	9	24	15	$22\frac{1}{2}$
$18\frac{1}{2}$	7	$10\frac{1}{2}$	$24\frac{1}{2}$	16	24
$19\frac{1}{2}$	8	12	25	17	$25\frac{1}{2}$
$20\frac{1}{4}$	9	$13\frac{1}{2}$	$25\frac{1}{2}$	18	27

Mem.—It will be seen that the weight is 1½ lbs to the gallon, and this rule holds good for larger sizes. The present price in Melbourne, Sydney, &c , is 18d. per lb.

TEST FOR IRON.—A soft tough, iron, if broken gradually, gives long silky fibres of leaden-grey hue, which twist together and cohere before breaking.

Badly refined iron gives a short blackish fibre on fracture, *a very fine grain* denotes hard, steely iron, likely to be cold-short.

A medium, even grain, with denser fibres, shows good iron.

Coarse grain, with bright cyrstalised fracture, or discoloured spots, denotes cold-short brittle iron, which works easily when heated, and welds well.

Cracks on the edge of a bar are indications of hot-short iron.

Good iron is readily heated, is soft under the hammer, and throws out few sparks.

Iron remains bright if touched with nitric acid.

TEST FOR STEEL.—Good steel in its soft state has a curved fracture and a uniform grey lustre ; in its hard state a dull silvery uniform white.

Nitric acid will produce a black spot on steel ; the darker the spot the harder the steel.

Cracks, threads, or sparkling particles denote bad quality.

Good steel will not bear a white heat without falling to pieces, and will crumble under the hammer at a bright red heat, while at a middling heat it may be drawn out, under the hammer, to a fine point. Care should be taken that before attempting to draw it out to a point the fracture is not concave, and should it be so, the end should be filed to an obtuse point before operating. Steel should be drawn out to a fine point and plunged into cold water ; the fractured point should scratch glass.

To test its toughness, place a fragment on a block of cast-iron ; if good, it may be driven by the blow of a hammer into the cast-iron ; if poor, it will crush under the blow.

BRASS COCKS, &c., FOR WATER OR STEAM.

Exclusive of firing. *Each.*	½ in.		¾ in.		1 in		1¼ in.		1½ in.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Square way, bib, or stop cocks	4	0	6	0	8	6	15	0	18	0
Round way cocks	5	0	7	6	10	0	18	0	22	0
Range boiler cocks with screw bottom	5	6	7	6	10	6				
High pressure bib or stop cocks	4	6	6	0	9	6	25	0	35	0
Brass tubing at 1s. 9d. per lb.	0	9	1	0	1	4	1	8	2	6

N.B.—If for more than one item deduct 10 per cent. from the above prices.

TAKING OUT QUANTITIES.—The weight in lbs. may be ascertained by multiplying the cubical inches of cast iron, wrought iron, or steel, brass, copper, and lead by 26, 28, 30, 32 and 41, respectively and cutting off two figures to the right, the remainder being lbs.

TABLE *of the Weight of a Superficial Foot of various Metals, in the*

Names.	Thickness by the Birmingham Wire Gauge.											
	1	2	3	4	5	6	7	8	9	10	11	12
Iron	12.50	12.00	11.00	10.00	8.74	8.12	7.50	6.86	6.24	5.62	5.00	4.38
Copper ...	14.50	13.90	12.75	11.60	10.10	9.40	8.70	7.90	7.20	6.50	5.80	5.08
Brass ...	13.75	13.20	12.10	11.00	9.61	8.93	8.25	7.54	6.86	6.18	5.50	4.81

	Thickness by the Birmingham Wire Gauge.											
	13	14	15	16	17	18	20	22	24	26	28	30
Iron	3.75	3.12	2.82	2.50	2.18	1.86	1.54	1.25	1.00	0.80	0.64	0.50
Copper ...	4.34	3.60	3.27	2.90	2.52	2.15	1.78	1.45	1.16	0.92	0.74	0.58
Brass ...	4.12	3.43	3.10	2.75	2.40	2.04	1.69	1.37	1.10	0.88	0.70	0.55

	Thickness, in parts of an inch.											
	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	1
Iron	2.5	5.	7.5	10.	12.5	15.	17.5	20.	25.	30.	35.	40.
Copper ...	2.9	5.8	8.7	11.6	14.5	17.4	20.3	23.2	28.9	34.7	40.4	46.2
Brass ...	2.7	5.5	8.2	10.9	13.6	16.3	19.0	31.3	27.1	32.5	37.9	43.3
Lead ...	3.7	7.4	11.1	14.8	18.5	22.2	25.9	29.6	37.0	44.4	57.8	59.2

Melbourne and Sydney prices per foot super.

	s.	d
Canaletti blinds, linen tick, in panelled and moulded cases, painted complete	2	3
Florentine blinds, ditto, do...	2	6
Spanish blinds ditto, do...	3	0
Oriental blinds for circular-headed windows ditto	3	6
Venetian blinds with tapes and cords, in panelled moulded cases painted complete	2	0

Small sizes less than 20 sup. feet, charged as 20 sup. feet.

INSIDE BLINDS, *per foot super.*

Venetian blinds, painted green, buff or drab from 11d. to	1	2

Sizes under 12 super feet charged as 12 feet.

Gauze wire and perforated zinc blinds in cedar polished frames, from 4s. to 5s. per foot ..		
Dwarf Venetian blinds, painted in polished cedar frames, each from 7s. to	10	0
Spring rollers complete, from	1	6

Price of square and round Iron, *per foot run.*

At 2d. per lb or 18s 8d. per cwt.

In.	*Square.* s.	d.	*Round.* s	d.	*In.*	*Square.* s.	d.	*Round.* s.	d	*In.*	*Square.* s.	d.	*Round.* s.	d.
$\frac{1}{4}$	0	$0\frac{1}{2}$	0	$0\frac{1}{2}$	$1\frac{1}{16}$	0	$8\frac{1}{2}$	0	7	2	2	3	1	9
$\frac{3}{8}$	0	1	0	1	$1\frac{1}{4}$	0	$10\frac{1}{2}$	0	$8\frac{1}{2}$	$2\frac{1}{8}$	2	6	2	0
$\frac{1}{2}$	0	2	0	$1\frac{1}{2}$	$1\frac{3}{16}$	1	1	0	10	$2\frac{1}{4}$	2	10	2	$2\frac{1}{2}$
$\frac{5}{8}$	0	$2\frac{1}{2}$	0	2	$1\frac{1}{2}$	1	3	1	0	$2\frac{3}{8}$	3	2	2	6
$\frac{3}{4}$	0	4	0	3	$1\frac{5}{16}$	1	6	1	2	$2\frac{1}{2}$	3	6	2	9
$\frac{7}{8}$	0	5	0	4	$1\frac{3}{4}$	1	$8\frac{1}{2}$	1	4	$2\frac{5}{8}$	3	10	3	0
1	0	$6\frac{1}{2}$	0	5	$1\frac{7}{16}$	1	$11\frac{1}{2}$	1	$6\frac{1}{2}$	$2\frac{3}{4}$	4	$2\frac{1}{2}$	3	3

For flat bars multiply the above prices by the width : *e g* :—
$\frac{3}{4} \times \frac{1}{4} = 1\frac{1}{4}$d. ; $1\frac{1}{2} \times \frac{1}{2} = 5$d. ; $2\frac{1}{2} \times \frac{5}{8} = 10\frac{1}{2}$d, and $2 \times \frac{1}{2} = 6\frac{3}{4}$d.

CAST IRON.

Melbourne and Sydney prices, exclusive of patterns and fixing, per cwt.

	£	s.	d
Ornamental air and light ventilators from 2.0 x 6 ins. to 3.0 x 12 ins. under windows, &c. for lighting basements, &c.	0	18	0
Cast-iron egg-shaped sewers, $1\frac{1}{4}$ in. thick ..	0	18	0
Ditto cap to engine-house or factory chimney in 4 sections, to be bolted together 20s. to	1	5	0

	s.	d
Hollow columns, with caps and bases ..	12s. to 16	0
Water or gas pipes with flange or faucet ends	12s. to 14	0
Furnace bars, sewer grates, and area gratings	14s. to 16	0
Furnace doors and frames, complete ..	18s. to 22	0
Cast-iron plates for floors, 3-16 in. to 5-16	12s. to 16	0
Cast-iron girders, best iron	18s. to 20	0
Roof or bridge castings, viz., heads, shoes, coupling, &c.	20s. to 25	0
Cast-iron steps and risers to geometrical steps, the riser ornamental, and the treads grooved	23s. to 30	0

Per lin. foot, fixed.

Balcony panels rich pattern fitted with wrought-iron top rail and standards, fixed complete	6s. to 9	0
Ditto, plain Gothic, or other patterns ..	5s. to 7	0
Ditto, very richly ornamented	7s. to 10	0
Cresting or ridging various patterns ..	2s. to 4	0
Window guards from 18 to 30 ins. high ..	5s. to 7	0
Friezes for verandahs, balconies, &c.,	1s. 3d. to 3	0

Each fixed.

Pilaster plain or ornamental, 7 to 9 feet long	20s. to 40	0
Ditto do. 9 to 12 feet long	30s. to 50	0
Brackets, ornamental, 21 to 30 inch sides	4s. to 23	0
Cantilevers for balconies	18s. to 35	0
Balusters, ornamental, for staircases,	3s. 6d. to 9	0
Newels ornamental, 4 to 8 ins. diam. ..	10s. to 35	0
Finials from 2 ft. to 7 ft. high	20s. to 76	0
Palisade or gate bars, average 4 ft. high, from	2s. 6d. to 3	6
Dog bars to match, half-price.		
Galvanizing *cast-iron* extra per cwt ..	26s. to 28	0

WROUGHT IRON.

Per cwt. exclusive of fixing.

Wrought bar, round or half-round iron ..	11s. to 13	0
Hoop iron, common	13s. to 15	0

	s.	d.		s.	d.
Hoop Iron, galvanized	30s.	to	34	0	
Best charcoal iron	18s.	to	20	0	
Sheet iron, 10 to 28 gauge..	14s.	to	18	0	
Plate iron, best charcoal plate $\frac{1}{8}$ in. to $\frac{5}{8}$ in. thick	16s.	to	20	0	
Angle T and channel iron	14s.	to	15	0	
Chains for crab winches, &c., $\frac{3}{8}$ to $\frac{1}{4}$ in. ..	22s.	to	32	0	
Galvanizing *wrought iron* extra from ..	18s.	to	20	0	

N.B.—Galvanizing wrought iron is said to make it brittle and unworkable so that it cannot be repaired or altered without extra cost. It also adds to the weight about 1½ ounces per sup. foot of surface galvanized, and about 2 ounces per sup. foot of cast iron galvanized.

IMPORTED IRONWORK.

Delivered in Melbourne or Sydney, per ton.

Wrought iron or Bessemer steel rails for tramways or railways £7

Cast-iron water-pipes, with spigot and faucet ends £6 to £7

Steel rails are said to last from nine to fourteen times as long as similar iron rails.

SMITH'S WORK.

WROUGHT IRON. *Fixed, per lb.*	From. s.	d.	To s.	d.
Wharves.—Wrought iron in straps, shoes, rings and straps of (mooring or other) piles, anchor and other bolts and dumps for planking	0	4	0	5
Bridges.—Bolts from 15 ins. to 36 ins long, including tie-bolts for king posts ..	0	4	0	4½
Wrought-iron cell doors for gaols, including hinges, straps, staples and fastenings, fixed complete	0	7	0	8
Plain square balusters for stairs, &c. ..	0	3½	0	4
Drawn balusters, with straps to pattern, and countersunk holes	0	5	0	6
Iron hand-rail and balusters, including fixing and lead	0	6	0	7
Iron roofs complete, including angle, T. and rod iron for rafters, struts, king and queen posts, tie-rods, &c.. ..	0	4	0	5

	s.	d.	s.	d.
Framed gates, with hinges and cast spear heads, &c.	0	6	0	7
Lamp irons, with braces or stays and straps, framed and curved	0	6	0	7
Hydraulic stamped spear heads, rosettes, &c., imported	0	9	0	10
Rolled iron double headed joists or girders, ditto	0	2	0	2½
Guard bars, with strap ends, unframed, for windows of stores, gaols, &c. ..	0	3½	0	4
Guard bars with two rows of spikes ..	0	6	0	7
Strong brackets, framed with braces ..	0	6	0	8
Iron work for pumps	0	7	0	8
Shop shutter-bars	0	5	0	6
Joints to ditto, with mortices and plates	0	7	0	9
Frames and doors, with moulded panels, fitted with rollers and plates	0	6	0	8
Columns, including cast caps and bases..	0	2½	0	3½
Chimney and bearing bars	0	3	0	3½
Ties and straps in floors and roofs ..	0	4	0	5
Straps or T. hinges with hooks and bolts	0	6	0	7
Screw bolts, nuts and washers, and king-post stirrups..	0	5	0	6
Pile shoes, with straps and nails ..	0	4	0	5
Framed grating for sewers and sink-stones	0	3½	0	4
Cradle bars, framed, 4d., ditto, trussed, with screws and nuts	0	5	0	6
Verandah and balcony 6 feet wide including all woodwork, ironwork, gal. cor. iron roof, &c., complete per lin. foot	40s. to 45		0	
Verandah only, with iron roof ditto do...	20s. to 23		0	

COLONIAL IRONWORKS are now competing successfully with imported articles in Victoria, N. S. Wales, &c., one of them, at least, is producing bar iron up to 5 x 1¾; round iron up to 3½ in. diam; square iron to 2 in. square; angle iron, with 3½ in. sides; bridge rails, from 14 lbs. to 20 lbs. per yard; T, rails, 14 lbs. to 45 lbs. per yard, and double-headed rails, from 75 lbs. to 80 lbs. per yard.

PLATE IRON TANKS cost about the same by weight as girders, with the addition of the cost of caulking, which is about equal to riveting. The sides of the plates should not butt as in girders, but should lap, and be double riveted, by which means much labour is saved, and the joints effectually caulked; this is almost impossible when the plates butt, even if the edges are shot or planed.

TABLE of the weight of a lineal foot of flat Bar Iron, in lbs.

Breadth in inches.	Thickness in parts of an inch.								
	¼	5/16	⅜	7/16	½	⅝	¾	⅞	1
1	·84	1 04	1·25	1·46	1·67	2·09	2·51	2·92	3·34
1¼	·94	1·17	1·41	1·64	1 88	2·35	2·82	3·29	3 76
1½	1·04	1·31	1·57	1·83	2·09	2·61	3·13	3·65	4 18
1⅝	1·15	1·44	1·72	2·01	2 30	2·87	3·44	4 02	4 59
1½	1·25	1·57	1·88	2·19	2·50	3 13	3·76	4·38	5·01
1⅝	1·36	1 70	2·04	2·37	2·72	3 39	4·07	4·75	5 43
1¾	1 46	1·83	2·19	2·56	2 92	3·65	4 38	5 11	5 85
1⅞	1 57	1·96	2·35	2·74	3·13	3·91	4·70	5·48	6 26
2	1·67	2·09	2·51	2 92	3·34	4·18	5·01	5·85	6·68
2¼	1 88	2·35	2·82	3·29	3 76	4·70	5·64	6·58	7·52
2½	2 09	2·61	3·13	3·65	4·18	5·22	6·26	7·31	8 35
2⅝	2·30	2·87	3·44	4·02	4 59	5·74	6·89	8·04	9·19
3	2·51	3·13	3·76	4·38	5·01	6 26	7·52	8·77	10·02
3¼	2 72	3·39	4·07	4 75	5 43	6 78	8 14	9·50	10·86
3½	2·92	3·65	4·38	5·11	5·85	7·31	8·77	10·23	11·69
3⅞	3·13	3·91	4·70	5·48	6·26	7 83	9 39	10 96	12·53
4	3 34	4·18	5·01	5 85	6 68	8 35	10·02	11 69	13 36
4¼	3·55	4·44	5 32	6 21	7·10	8·87	10 65	12·42	14·20
4½	3·76	4·70	5·64	6·58	7 52	9 39	11 27	13·15	15·03
4⅝	3 97	4·96	5 95	6 94	7·93	9 92	11·90	13·88	15·86
5	4·18	5·22	6 26	7·31	8·35	10 44	12·53	14·61	16·70
5¼	4 38	5·48	6·58	7·67	8·77	10 96	13·15	15·34	17 54
5½	4 59	5·74	6 89	8·04	9·19	11 48	13·78	16·07	18·37
5¾	4 80	6·00	7·20	8·40	9·60	12 00	14·40	16 80	19·20
6	5 01	6·26	7·52	8 77	10 02	12·52	15·03	17 54	20·04

Cast iron pipes less than 3 ins. diam. have been almost superseded by malleable iron pipes.—See p. 118 for prices of wrought iron pipes.

Weight of malleable iron pipes per lineal yard :—

Bore or diam. ins. ...	¾	1	1¼	1½	1¾	2
Lbs. per lin. yard ...	4½	8	10	12	14	15

ENDS OF PIPES.—The 2 flanges of a flange pipe, or the faucet end of a socket pipe, are equal in weight to from 8 to 12 ins. of the pipe.

TABLE exhibiting the weight of a lineal foot of square and round Bar Iron.

Side and diam. in inches.	Square in lbs	Round in lbs.	Side and diam. in inches.	Square in lbs.	Round in lbs.	Side and diam. in inches.	Square in lbs.	Round in lbs.
1/4	.21	.16	1 1/8	7.52	5.91	3 1/8	40.92	32.17
5/16	.33	.26	1 5/16	8.83	6.93	3 5/16	43.89	34.47
3/8	.47	.37	1 3/8	10.23	8.04	3 3/8	46.97	36.90
7/16	.64	.50	1 7/16	11.74	9.22	3 7/16	50.15	39.39
1/2	.84	.66	2	13.36	10.50	4	53 44	41.98
9/16	1.06	.83	2 1/8	15.08	11.85	4 1/8	56.83	44.64
5/8	1.31	1.03	2 1/4	16.91	13.28	4 1/4	60.33	47.39
11/16	1.58	1.24	2 3/8	18.84	14.80	4 3/8	63.93	50.21
3/4	1.88	1.48	2 5/16	20.88	16.40	4 5/16	67.64	53.13
13/16	2.21	1.73	2 3/8	23.12	18.15	4 3/8	71.45	56.11
7/8	2.56	2.01	2 7/16	25.26	19.84	4 7/16	75.36	59.19
15/16	2.94	2.31	2 1/2	27.61	21.68	4 1/2	83.51	65.59
1	3.34	2.62	3	30.07	23 65	5	92.46	72.62
1 1/16	4.23	3.32	3 1/8	32.62	25.62	5 1/4	101.04	79.37
1 1/8	5.22	4.10	3 1/4	35.28	27.71	5 1/2	110.43	86.73
1 3/16	6.32	4.96	3 3/8	38.05	29.88	6	120.24	94.61

Weight of Cast Iron Pipes.

Note.—The inch pipes are 3½ feet long, the 1½ inch 4½ feet long the 2 and 2½ inch are 6 feet long, and the other sizes 9 feet long.

Bore.	Thick.	Weight.			Bore.	Thick.	Weight			Bore.	Thick	Weight.		
In.	In.	cwt.	qrs.	lbs.	In.	In	cwt.	qrs.	lbs.	In.	In.	cwt.	qrs.	lbs
1	¼	0	0	12	5½	½	2	2	0	12	¾	7	3	20
	⅜	0	0	21		⅝	3	0	18		1	10	3	0
1½	¼	0	0	21		¾	3	3	7	13	¾	8	2	7
	⅜	0	1	4	6	½	2	2	21		1	11	2	12
2	¼	0	1	8		⅝	3	1	17	14	⅝	7	2	16
	⅜	0	2	0		¾	4	0	16					0
2½	⅜	0	2	10		1	5	2	20		1			14
	½	0	3	10	7	½	3	0	7	15	⅝	9	3	7
3	⅜	1	0	6		⅝	3	3	20		1	13	0	26
	½	1	1	12		¾	4	3	5		1¼	16	3	5
	⅝	1	3	6		1	6	2	4	16	⅝	10	1	20
3½	⅜	1	0	21	8	⅝	4	1	25		1	14	0	8
	½	1	2	14		¾	5	1	18		1¼	17	3	14
	⅝	2	0	8		1	7	1	16	18	1	15	2	24
4	½	1	3	12	9	⅝	5	0	4		1⅛	17	2	26
	⅝	2	1	12		¾	6	0	2		1¼	20	0	2
	¾	2	3	21		1	8	0	26	20	1	17	1	15
4½	½	2	0	4	10	⅝	5	1	26		1¼	21	3	24
	⅝	2	2	14		¾	6	2	14	22	1	18	3	18
	¾	3	0	21		1	9	0	8		1¼	24	0	23
5	½	2	1	10	11	⅝	6	0	11	24	1	20	3	5
	⅝	2	3	17		¾	7	1	7		1⅛	23	2	4
	¾	3	1	24		1	9	3	20		1¼	26	1	10

Jointing Pipes.—Lead and gasket or fine hemp rope and labour, for joints of socket pipes.

Diam inches ...	4	6	9	12	15	18	24	30	36	42	48
Lead, lbs	6	9	14	21	29	38	48	59	70	82	94
Gasket, pence ...	4	6	8	10	12	15	18	21	24	27	30
Labour, pence ...	8	12	16	21	30	36	48	60	72	84	96

Two rings or coils of gasket are generally used, about 1½ inches wide together.—It is necessary that the pipes should be dry and the mouth of the clay ring oiled to prevent the explosive effect of the steam generated by the sudden contact with the melted lead. Clay only can be used for pipes up to 18 ins. diam, a leather strap or rope will hold the clay for 24 in pipes, above this size it is expedient to use iron collars or straps in semi-circles screwed together with bolts at bottom and top, these fit closely to the required joint and are lightly covered with clay. The large pipes can be run with one melting of lead, if heated to a blue tinge, after the joint is run, it is caulked. The cost of laying the pipes up to 9 ins. diam. would be about 20 per cent. more than for earthern pipes, as per page 31, above this size as follows :—

Labour in carting one mile, lowering and levelling pipes and adjusting for joints.

Diam. inches ...	12	15	18	24	30	36	42	48
Pence per lin. foot...	18	24	30	36	42	48	54	60

The cost of excavation in hard clay or light shale to a depth of 3 feet including recesses for jointing, refilling in 9-inch layers, watering and ramming per lineal foot will be about 50 per cent. more than last item for lowering, laying, &c.

Flange pipes are jointed with a collar of 3 or 4 lb. lead, bedded in soft red lead putty and screwed together with bolts from 3 to 6 inches apart.

WEIGHT OF A LINEAL FOOT OF CAST-IRON PIPES IN LBS.

Bore inches.	Thickness of Metal.	Weight lbs.	Bore inches.	Thickness of Metal.	Weight lbs.	Bore inches.	Thickness of Metal.	Weight lbs.
3	$\frac{3}{8}$	12·4	11	$\frac{1}{2}$	56·4	22	$1\frac{1}{8}$	254·9
	$\frac{1}{2}$	17·1		$\frac{5}{8}$	71·0		$1\frac{1}{4}$	284·8
	$\frac{5}{8}$	22·2		$\frac{3}{4}$	86·4	24	1	245·0
4	$\frac{3}{8}$	16·1		$\frac{7}{8}$	101·8		$1\frac{1}{8}$	276·9
	$\frac{1}{2}$	22·1	12	$\frac{5}{8}$	77·3		$1\frac{1}{4}$	319·3
	$\frac{5}{8}$	28·3		$\frac{3}{4}$	93·7	27	1	276·0
5	$\frac{3}{8}$	19·8		$\frac{7}{8}$	110·4		$1\frac{1}{8}$	311·0
	$\frac{1}{2}$	26·9		1	127·4		$1\frac{1}{4}$	348·0
	$\frac{5}{8}$	34·4	14	$\frac{5}{8}$	89·6		$1\frac{3}{8}$	384·0
6	$\frac{3}{8}$	23·4		$\frac{3}{4}$	108·4	30	1	305·0
	$\frac{1}{2}$	31·9		$\frac{7}{8}$	127·5		$1\frac{1}{8}$	345·0
	$\frac{5}{8}$	40·6		1	147·0		$1\frac{1}{4}$	384·0
	$\frac{3}{4}$	49·7	15	$\frac{3}{4}$	115·7		$1\frac{3}{8}$	424·0
7	$\frac{3}{8}$	27·1		$\frac{7}{8}$	136·1	33	1	335·0
	$\frac{1}{2}$	36·8		1	156·8		$1\frac{1}{8}$	378·0
	$\frac{5}{8}$	46·7		$1\frac{1}{8}$	177·7		$1\frac{1}{4}$	421·0
	$\frac{3}{4}$	56·8	16	$\frac{3}{4}$	123·1		$1\frac{3}{8}$	465·0
8	$\frac{3}{8}$	30·8		$\frac{7}{8}$	144·7	36	$1\frac{1}{8}$	411·0
	$\frac{1}{2}$	41·6		1	166·6		$1\frac{1}{4}$	458·0
	$\frac{5}{8}$	52·8		$1\frac{1}{8}$	188·7		$1\frac{3}{8}$	506·0
	$\frac{3}{4}$	64·3	18	$\frac{3}{4}$	137·9		$1\frac{1}{2}$	554·0
9	$\frac{3}{8}$	34·4		$\frac{7}{8}$	161·8	42	$1\frac{1}{8}$	478·0
	$\frac{1}{2}$	46·6		1	186·2		$1\frac{1}{4}$	532·0
	$\frac{5}{8}$	58·9		$1\frac{1}{8}$	210·8		$1\frac{3}{8}$	588·0
	$\frac{3}{4}$	71·7	20	$\frac{7}{8}$	178·9		$1\frac{1}{2}$	644·0
10	$\frac{1}{2}$	51·4		1	205·8	48	$1\frac{1}{8}$	544·0
	$\frac{5}{8}$	65·1		$1\frac{1}{8}$	232·9		$1\frac{1}{4}$	605·0
	$\frac{3}{4}$	79·0		$1\frac{1}{4}$	260·3		$1\frac{3}{8}$	669·0
	$\frac{7}{8}$	93·3	22	1	225·4		$1\frac{1}{2}$	733·0

Plain sheets for working up.—26 gauge is mostly used. The sheets are 6 ft. long by 24, 30, and 36 inches wide, and contain 220, 180, and 150, sheets per ton respectively. Numbers 22, 24 and 28 gauges are also imported.

Corrugated galvanized iron in sheets 4½ ft., 5ft. 6 ft., 7 ft., 8 ft., 9 ft., and 10 ft. long by 2 feet 3 inches wide, with 3½ inch corrugations, or 2 feet wide with a lap of one corrugation, which is sufficient for fences, but a lap of two corrugations is required for ordinary roofs, with an end lap of at least 6 inches.

Gauges imported	24	26
Lbs. per square, lapped 2 corrugations ...	180	130
Lbs. per square, lapped 1 corrugation ...	150	110
Squares per ton, ditto ...	15.00	20.36
Ditto do. 2 ditto ...	12.44	17 23

This calculation is made from the average number of 5 and 6 feet sheets per ton, reckoning five of each for single lap and 6 of each for double lap and 12 ins. for end laps per square.

SHEETS PER TON.—These vary slightly with different makers but the following is the average of several comparisons :—

Gauge.	5 feet.	6 feet.	7 feet.	8 feet.	9 feet
24	160	138	114	102	88
26	222	186	159	139	123
Ditto, Morewood's or Braby's	221	184	158	137	121
Ditto A1 Crown Brand	220	180	156	136	120

SHEETS IN HALF-TON CASES *of best brands.*

	5 ft.	6 ft.	7 ft.	8 ft.	9 ft.	10 ft.
24 gauge ...	80	69	57	51	44	40
26 gauge ...	110	90	78	68	60	53

The cases weigh from 28 to 50 lbs. each.

The present prices for 26 gauge range from £20 to £21 per ton. 24 gauge is worth about £1 more than 26 gauge.

The 10 feet sheets are worth about £8 per ton, and 9 feet sheets 30s. per ton more than the short sheets, and are generally 26 gauge.

Plain galvanized iron sheets, 6 ft. by 24, and 30 ins. wide per ton £30 to £34.

Galvanized iron nails 1½ in., 1¾ in., 2 in., 2½ in, per lb. ... ... 8d.
Lead washers for ditto ditto ... ... 4d. to 5d.
Galvanized iron bolts and nuts, per gross ... ... 5s.

N.B.—The above single prices are liable to fluctuation and should not be depended on where large quantities are required.

GALVANIZED IRON FENCING

Mesh wires for fences, &c., from ½ in. to 3 in. meshes, made with wire from No. 16 to 20 gauge, in rolls from 1 to 4 feet wide, the price varying from 3d. to 5d. per foot super. according to size of mesh, and gauge of wire.

LABOUR ONLY, *per square.*

	s.	d.
Hip roofs, covered with corrugated gal. iron 24 to 26 gauge, double laps	8	0
Gable roofs, ditto do.	6	0
Ditto, no cutting and flat roofs	4	0
Balcony, verandah, curved roofs 10s. to	12	0
Rolling and soldering old cor. gal. iron extra p. sq.	4	0
Fences, 6 feet sheets, nailed bottom, top, and middle at the middle and sides of sheets	4	0

Present wages of Ironworkers, per hour, 1s. 6d.

ROUND GALVANIZED IRON WATER TANKS.

Fitted with Taps and Wastepipes.	26 ga.	24 ga.
	d.	d.
Under 100 gals. .. .. .. per gal.	$4\frac{1}{4}$	$5\frac{1}{2}$
100 gals., and under 200 gals	4	5
200 ,, ,, ,, 300 ,, ...	$3\frac{1}{4}$	$3\frac{1}{2}$
300 gals. and under 400 gals.	$2\frac{3}{4}$	$3\frac{1}{4}$
400 ,, ,, ,, 600 ,, ...	$2\frac{1}{2}$	3
600 ,, ,, ,, 800 ,, ...	$2\frac{1}{4}$	$2\frac{3}{4}$
800 ,, ,, ,, 1200 ,, ...	2	$2\frac{1}{2}$

SUNDRIES, *Each.*	£	s.
Cast-iron chimney pieces, each, from	2	0
Cast iron sanitary sinks, 24 ins. by 18 ins. with grating and bell trap galvanized	1	4
Gal. iron composition columns, up to 8 ft. long, with cast zinc capitals and bases, from 3 to $4\frac{1}{2}$ ins. diam. .. .. 13s. to	1	3
Ditto from 5 to 6 ins. diam. .. .. 26s. to	1	11
Double purchase crab winch from ..	£6 to	16 0

If over 8 ft. long, add one-eighth per foot extra. These columns are also made from 7 to 10 ins. diam. and might be used in halls, &c., instead of brick in cement and Keenes' cement, or for outside columns, instead of Portland cement with brick in cement cores.

Quarry or building crane to raise 4 tons may be made with crab winch as above, viz, crane post, hardwood 35 ft. by 9 ins. sq. Oregon jib 25 ft. by 9 ins. by 6 ins with iron sheaves or wheels let into crane post and jib, $\frac{1}{2}$ in chain, four $1\frac{1}{2}$ in. girt gal. wire rope guides, each 66 ft. long, also 20 fathoms $2\frac{1}{2}$ ins. girt best rope, iron fittings, labour, &c., complete at a cost of about £50.

Wrought Iron Girders.

Wrought iron is now extensively used in the construction of girders and breastsummers, to support walls over shop fronts, heavily loaded floors of mills, stores, &c., and is superseding wooden and cast iron girders. Cast iron is liable to crack from sudden shocks, or from the sudden application of cold water while in a heated state, and in case of fire is little better than wood.

The following table for wrought iron girders is for such spans as are most in use without the intervention of columns. To support walls and heavy machinery, the box girder will be found the best, but for loaded floors, the plate girder offers many advantages :—

Spans.	Height of 18 inch walls supported.	Constant load of walls, floors and roofing.	Sectional area of bottom of girder.	Sectional area of top of girder.	Depth of girder.	Thickness of vertical plates.	Angle irons.
10 ft.	10 ft.	13 ton.	5 in.	6 in.	9 in.	3-16 in.	in.
do.	15 ,,	18 ,,	6 ,,	7 ,,	do.	do.	
do.	20 ,,	24 ,,	8½ ,,	10 ,,	do.	do.	2½x2½x⅜
15 ft.	10 ,,	20 ,,	8 ,,	9 ,,	12 in.	¼ in.	in.
do.	15 ,,	26 ,,	10 ,,	12 ,,	do.	do.	
do.	20 ,,	35 ,,	13½ ,,	15 ,,	do.	do.	2½x2½x7-16
20 ft	10 ,,	5 ,,	9½ ,,	11 ,,	16 in.	5-16 in.	in.
do.	15 ,,	35 ,,	13½ ,,	15 ,,	do.	do.	
do.	20 ,,	46 ,,	18 ,,	21 ,,	do.	do.	3x3½ 2½x2½x⅜

These beams are calculated to break with about four times the loads, in tons, here mentioned,

Wrought iron plate girders, of the same strength as the box girders, given above, may be made by increasing the area of the top and bottom plates ½ inch, the thickness of the vertical plates for the 10 feet girders ⅜ inch, and the 15 and 20 feet girders, 3-16ths inch.

In plate iron girders, not only the sectional areas must be correct, but also the perfect arrangement of the joints must be attended to.

All joints should butt close together, covered with proper jointing strips, and no two joints should occur in the same place. In punching the plates and angle irons, the sectional areas should be diminished only to the extent necessary for rivets of the proper size ; and plates, &c., imperfectly punched, should be rejected.

The rivets should be of Lowmoor or other superior iron, and where the strain depends on them, their *collective areas should equal the sectional areas of the plates connected.*

All girders should be so secured on walls as to admit of expansion and contraction.

LABOUR ONLY. *Per cwt. including scaffolding.*

Wages of Fitter 1s. 6d., and Holder-up 1s. per hour.

	s.	d.
Fitting and riveting large lattice girders, previously put together, over land bays and spans	4	4
Ditto, ditto, over water, rivers, &c.	5	0
Riveting only, per 100 rivets from 11s. to	12	6
Ditto, with machine, from 3s. 3d. to	4	2
Rimering, if badly fitted, extra per rivet 4d. to	0	6
Making, punching, riveting, constructing, fitting, and fixing large plate girders for bridges, &c. ..	15	0
Ditto, lattice or triangular girders, or large tanks	20	0
Ditto, small box or plate girders for floors, shop-windows, &c., or small tanks, caulked	22	6

The above items will give the net cost without *rimering*, which must be allowed for as per item 5, according to the care bestowed upon the manufacture and fitting, with incidental expenses, cartage, and profit upon the whole outlay per cwt.

WIRE FENCING.

ANNEALED DRAWN BLACK IRON FENCING WIRE.

In Melbourne, Sydney and Brisbane.

Wire Gauge.	WEIGHT OF FENCE PER MILE FOR												Length of Cwt.
	1 Wire.			2 Wires.			3 Wires.			4 Wires.			5 Wires.			
	Cwt.	qr.	lbs.	Cwt.	qr.	lbs.	Cwt.	qr.	lbs.	Cwt.	qr.	lbs.	Cwt.	qr.	lbs.	Yards.
4	6	3	17	13	3	0	22	2	23	27	2	12	34	2	1	255
5	5	3	6	11	2	12	17	1	18	23	0	24	29	0	2	303
6	4	3	14	9	3	0	14	2	14	19	2	0	24	1	19	361
7	4	0	13	8	0	26	12	1	11	16	1	24	20	2	9	428
8	3	1	23	6	3	18	10	1	13	13	3	8	17	1	3	509
9	2	3	15	5	3	2	8	2	17	11	2	4	14	1	19	609
10	2	1	12	4	2	24	7	0	8	9	1	20	11	3	4	748
12	1	1	18	2	3	8	4	0	20	5	2	16	7	0	6	1244

PRICES PER SHEET OF COR. GAL. IRON AT £24 PER TON.

	5 feet		6 feet		7 feet		8 feet		9 feet		10 feet.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
24 Gauge ...	3	0	3	6	4	1	4	8	5	4	6	0
26 Gauge ...	2	2	2	7½	3	1	3	6½	4	0	4	6

Wire Gauge.	Weight of Fence Per Mile.									
	1 Wire.		2 Wires.		3 Wires.		4 Wires.		5 Wires.	
	Ct. qr. lbs.		Cwt. qr. lbs.		Cwt. qr. lbs.		Ct. qr. lbs.		Ct. qr. lbs.	
7 equal 5 common Wire	3 3 0		7 2 0		11 1 0		15 0 0		18 3 0	
8 „ 6 „ „	3 0 0		6 0 0		9 0 0		12 0 0		15 0 0	
9 „ 7 „ „	2 1 19		4 3 10		7 1 1		9 2 20		12 0 11	
10 „ 8 „ „	2 0 0		4 0 0		6 0 0		8 0 0		10 0 0	

Although the Patent Oval Samson Wire is worth much more per ton than the common iron wire, there is said to be a considerable saving in using it on account of its superior strength, weight for weight.

The prices of the best black iron wire in Melbourne, Sydney, &c., vary from £12 to £16 per ton.

Post boring and morticing machines with chisels and bits, £20.

Post boring apparatus, 38s. to 50s.

Fencing braces all iron, 6s. each.

Wire straighteners, 8s. to 25s. each.

Earth borers for fencing posts, 3 sizes, viz. :—

Size of holes,	7 inch,	9 inch,	12 inch.
Price	21s.	25s.	40s.

GUN AND MUNTZ METAL.

Per lb. including patterns and fixing.

	s.	d.
Gun metal to top railing and curved balusters of light house	1	6
Ditto casements about 30 lbs. each, size 24 ins. x 12 ins.	2	0
Ditto sluice valves to sewer pipes	1	9
Sheathing piles with 20 oz. muntz metal to 18 ins. below rock on planted piles, and 6 ft. below ground on driven piles, including 1½ in. muntz metal nails for ditto ¾ lbs. to each sheet, size of sheets, 48 ins. x 14 ins.	1	3
Fixing No. 20 gauge muntz metal, round piles from 10 to 20 feet under water, including nails, as before	2	0

N.B.—The charge for a diver and attendant, including all necessary apparatus is 5 guineas per day from 9 a.m. to 4 p.m. A diver will nail on to piles about 14 sheets of muntz metal per day or one sheet in 2 hours under water.

For the weight of muntz metal sheets. See page 130, taking the same weight as brass.

QUARRYMAN'S TOOLS.

	Per lb.	s.	d.
Octagonal steel drill and jumpers ..	.. 8d. to	1	0
Wedges, wrought iron, steel pointed	.. ..	0	5
Picks	do.	0	9
Scappling hammers	10d. to	1	0

HOISTING APPARATUS.—*Each.*

	£	s.
Weston's patent differential iron pulley blocks, will hold without break, to hoist 5 cwt.	1	10
Ditto, do. 10 ,, ...	2	0
Ditto, do. 12 ,, ...	2	5
Ditto, do. 20 ,, ...	3	0

Each hoist includes 40 lin. feet of chain. If 50 feet of chain is required, add one-fourth to prices

Moore and Head's patent hoist to raise 10 cwt. ..	5	10
Ditto, do. 15 cwt. ..	9	0

Including 26 feet of lifting chain and 48 feet of hand chain.

BUILDERS' IRONMONGERY.

Melbourne and Sydney Prices.

CUT TACKS.

Per lb.	s.	d.
⅜ and ½ inch	0	4
⅝ inch 6d., ¾ inch ..	0	7
8 oz Flemish wrought	1	0
14 oz. ditto	1	6
Cut lath nails per lb.	0	3

BRASS HEADED NAILS.

Per dozen.	s.	d.
From 1 to 4 inches from 2d. to	0	9
Do. per gross, 1s 6d to 7	0	

COUNTERSUNK CLOUT.

Per lb.	s.	d.
From 1 to 3 inches, and from 10d to	0	5
Clout nails	1	0

EWBANK'S PATENT NAILS.

Weight per M lbs	Price per cwt. s.	d.	per lb. s.	d.
1 inch 2½ ..	80	0	0	10
1¼ inch 3½	62	0	0	8
1½ inch 4	68	0	0	7½
1½ inch 7 ..	36	0	0	4½
1¾ inch 8 ..	34	0	0	5
2 inch 10 ..	33	0	0	4½
2 inch 7 ..	45	0	0	6
2¼ inch 12 ..	30	0	0	5
2½ inch 17 ..	28	0	0	4
3 inch 25 ..	26	0	0	3½
3½ inch 32 ..	24	0	0	3½
4 in. 4½ in. / 5 in. 6 in.	23	0	0	3½

AMERICAN CUT NAILS.

1 inch per cwt. ..	35 0
2 inch	30 0
3 inch	25 0

AMERICAN FINISHING NAILS.

In 1lb packets. s. d.

1 inch to 3 inch from 1s to 0 8

SLATE NAILS.

Per lb.

Zinc 1, 1¼, and 1½ inch	0 6
Composition ..	1 3
Copper	1 9

WIRE NAILS.

¾ inch to 2 inch 30s. to 20s.
2½ inch to 6 inch 20s. to 17s. per cwt.

SPIKES.

6 inch 5 oz., 7 inch 6oz., 8 inch 7 oz., 9 inch 6 to 8 oz. each and 28s. per cwt.

IRON BOLTS.

Per inch, including screws.

	s.	d.
Japanned barrel ..	0	1½
Bright tower or barrel	0	1
Light spring ..	0	1

BRASS FLUSH BOLTS.

Each.

	½ inch.		¾ inch.		1 inch	
	s.	d.	s.	d	s.	d.
2½ inch	0	3	0	4	0	7
3 ..	0	4	0	5	0	9
4 ..	0	5	0	6	0	10
5 ..	0	6	0	8	1	1
6 ..	0	7	0	9	1	1
7 ..			0	11	1	6
8 ..			1	0	1	8
9 ..			1	2	1	11
10 ..					2	1
12 ..					2	6
18 ..					3	9
24 ..					5	0

SCREWS.

Per dozen.	Iron		Brass.	
	s.	d.	s.	d.
½ and ¾ inch	0	1	0	3
1 inch ..	0	1½	0	6
1¼ inch ..	0	2	0	7
1½ inch ..	0	2½	0	8
1¾ inch ..	0	3	0	9
2 inch ..	0	3½	1	0
2½ inch ..	0	4	1	4
3 inch ..	0	5	2	0
3½ inch ..	0	8		
4 inch ..	1	0		

SASH PULLIES.

Per dozen.	Iron.		Brass.		Brass. Axles.	
	s.	d.	s.	d.	s.	d.
1½ in. ..	3	9	7	0	0	10
1¾ in. ..	3	6	5	6	1	0
2 in. ..	4	6	10	0	1	4

HINGES.

Per pair, including screws.

BUTTS AND BACK-FLAPS.

	Cast Iron.		Wrought Iron.		Cast Brass.	
1 inch ..	0	2	0	3	0	4
1¼ ..	0	3	0	3	0	5
1½ ..	0	4	0	4	0	6
2 ..	0	4	0	5	0	8
2½ ..	0	5	0	6	0	10
3 ..	0	6	0	9	1	3
3½ ..	0	7	1	0	2	6
4 ..	0	8	1	5	3	6
4½ ..	1	0	1	6	4	6
5 ..	1	3	1	9	6	0

GATE HINGES.

With bolts and nuts complete.

ft.	in.	*Per pair.*	s.	d.
1	6	strong	4	6
2	0	do.	6	0
2	3	do.	7	0
2	6	do.	7	6

CIRCULAR DOOR SPRINGS.

	Brass. s.	d.	Iron. s.	d.
Small size ..	7	0	3	6
Do., middle size	8	6	4	0
Do., large size	10	0	4	6
4 in. brass door spring hinge	10	0		

SWING CENTRES FOR DOORS.

Double action to open both ways.

Smith's patent, each 30s.

Whitehouse's patent, 15s. to 30s.

Patent climax, 12s. to 25s.

BRASS PEW HINGES.

Each.	s.	d.
To project 1 inch ..	3	0
1½ inch ..	4	3
2 ..	4	6

CROSS GARNETS OR T HINGES

per pair.	s.	d.
10 inch strong ..	0	6
12 7d .. 14 in.	0	8
16	0	10
18	1	0
20	1	3
Larger sizes, per lb.	0	6

To be measured from the joint.

PARLIAMENT HINGES.

Cast iron, per pair.

3½-in.	4-in.	4½-in.	5-in
7d.	8d.	10d.	1s.

HOOKS AND HINGES.

Per pair.

	s.	d.
12 inch	1	0
14 do.	1	6
16 do.	2	0
18 do.	2	6
20 do.	3	0
22 do.	4	0
24 do.	5	0

RISING SKEW BUTTS.

Per pair.	Iron. s	d.	Brass. s.	d.
3 inch ..	1	0	10	6
3½ do. ..	1	3	11	6
4 do. ..	1	6	13	0
4½ do. ..	2	0	16	0

HOBBS PADLOCKS.

	Brass s.	d.	Iron s.	d.
2 inch	8	6	4	0
2½ inch	10	6	4	6

BRASS PROJECTING BUTTS.

Per pair.

Height.	Width.	s.	d.
3 by	2½	2	10
3½ ,,	3	4	8
4 ,,	3½	5	10
4½ ,,	3¾	7	2
5 ,,	4	9	4
3 ,,	4	5	6
3½ ,,	4½	6	6
4 ,,	5	8	6
4½ ,,	5½	11	0
5 ,,	6	15	0

Best Locks.

Each.	From s.	From d.	To s.	To d.
8-in. fine ward common stock ..			1	6
9 inch ditto ..			1	9
10 inch ditto ..			2	0
12 inch ditto ..			3	0
8 inch fancy bushed stock			3	6
10 inch ditto			4	6
4 in. dead lock	1	3	2	0
5 inch ditto ..	1	6	2	3
6 inch ditto ..	1	4	3	0
8 inch ditto ..	2	7	4	6
10 in. ditto ..	5	8	7	3
3 in. cupboard lock	0	9	1	6
3½ inch ditto ..	1	0	1	6
4 in. ditto fine	1	4	1	10
Fancy ditto ..	1	6	2	0
3½ tumbler brass	2	0		
Cut ditto ..	2	6		
5 in. iron rim 2 bolt knob lock, best ..	2	6	3	6
6 inch ditto ..	3	0	4	0
7 inch ditto ..	4	0	5	0
8 inch ditto ..	5	6	6	0
7 in. iron rim round ward, stop & 3-bolt brass knob lock	5	0	6	0
8 inch ditto ..	6	6	7	6
9 inch ditto ..	8	0	9	6
6 in. mortice or brass case	6	6		
7 inch ditto ..	7	6		

Chubb's Patent Detector Locks.

Each 6 *tumblers.*	*Inches.*	*s.*	*d.*
Till or drawer, to	3	12	6
Cut and straight cupboard, to	4	12	0
Chest, desk, & Linkplate cupboard lock	3	14	0
	3½	15	0
	4	16	0
	4½	17	0
Iron rim. dead one side	6	26	0
	7	28	0
	8	33	0
	9	39	0
	10	50	0
	12	64	0
Mortice, dead lock	3	27	0
	4	29	0
	5	30	0
	6	33	0
	7	10	0
Mortice, 3 bolt	6	52	0
	7	56	0
Flush spring latch	2½ to 3½	26	0
	4½	31	0
Mortice, do. do	4	31	0
Spring locks for front doors and 3-bolt rim locks	4	43	0
	5	45	0
	6	50	0
	7	25	0
	8	56	0
	9	62	0
	10	70	0
Patent Combination latches	4	16	0
	5	17	0
	6	18	0

	*Mortice furniture.		Large knobs.		Bell levers.		Pull outs.	
	s.	d.	s.	d.	s.	d.	s.	d.
China, white or black ..	1	9	1	3	3	6	2	0
,, ivory tint	2	6	1	8	5	0	6	0
,, gold scroll	3	0	3	6	7	6	7	0
,, gilt and flowers ..	4	6	3	6	8	0	9	0
,, plain gold lined ..	2	9	1	6	6	0	8	0
Ebony	2	3	1	9	4	6	6	0
Brass	1	3	3	0	3	6	4	3
Patent horn	6	6	3	0	7	0	9	0
Fancy crystal glass ..	9	0	4	0	11	0	13	0
Ditto amber cut	20	0			15	0	18	0

* MORTICE FURNITURE includes 2 knobs, bolt knob, and two escutcheons.

LONG FINGER PLATES same price as mortice furniture.

DOOR SPRINGS, iron japanned, brass mounted, per inch 2d.

Do., Cartland's patent double action, from 15s. to 30s. each.

Indian rubber door springs .. .. 1s. 6d. to 2s.
Stanhope door springs, japanned 8 inch .. .. 4s. 6d.
Ditto do. 5 inch .. .. 2s. 6d.
Paragon light spring brass .. .. .. 5s. to 6s.

Japanned tail door springs each..	12in. 1s 6d	14in. 1s 9d	16in. 2s 0d	18in. 2s 3d	20in. 2s 6d	22in. 2s 9d
Patent helical door springs ..	3s 0d	4s 0d	5s 0d	5s 6d	6s 0d	

	s.	d.
Bow latch, 4 in., with brass knobs..	1	3
Imitation Bramahs, 4 in., best night latches, with iron rim	5	6
Ditto, with brass rim	7	6
Brass case pulpit latch .. .. 3s. 6d. to	6	0
Thumb, or Norfolk latches .. .. .. 6d. to	1	0
Latches for self shutting gates per dozen	15	0
Night latches with 2 keys .. .. 21s. to	60	0
American (Yales) night latches with 3 small keys	12	0
Handles, 5 inch, brass, each.. .. 1s. to	2	0
,, 6 in., do. do. .. .. 1s. 6d. to	3	0
,, 7 in., do. do. .. .. 2s. 6d. to	4	6
,, 8 in., bronze or fancy ..	6	0

Handles, china, amber and crystal, p. pair	4s. 6d. to 20 0
Brass door hooks, per inch	0 4½

CARPENTERS' PATENT RIM LOCKS.

5 in.	6 in.	7 in.	8 in.	9 in.	10 in.
3s. 2d.	3s. 6d.	4s. 3d.	5s. 9s.	10s.	15s.

Improved furniture for ditto 15d. to 20d. per set

IMITATION DITTO.

5 in.	6 in.	7 in.	8 in.	9 in.	10 in.
2s.	2s. 3d.	2s. 9d.	4s.	6s.	7s. 6d.

FINE WARD DRAW-BACK LOCKS.

	7 in.	8 in.	9 in.	10 in.	12 in.
Common	4s.	5s.	6s.	8s.	11s.
Better..	5s.	6s. 6d.	8s.	9s. 6d.	15s.

MORTICE SASH LOCKS, *with brass furniture, each.*

	s.	d.		s.	d.
4 inch	4	0	6 inch	6	0
5 inch	5	0	7 inch	7	0

If rebated, add 25 per cent.

MORTICE IRON LOCKS, *with crank furniture, each.*

1¼ in.	1½ in.	1¾ in.	2 in.
4s.	4s. 6d.	5s.	6s.

If rebated one-half more.

	s.	d.
MORTICE SASH LATCHES, with furniture complete from	3s. to 4	0
CABIN BRASS LOCKS each	7s. 6d. to 8	6

SASH FURNITURE.

	s.	d.
Sash fastenings, burglar proof, each ..	10d. to 1	3
Sash fastening and screws, ditto, ..	6d. to 4	6
Spring roller ditto, ditto	1s. to 2	0
Cranked ditto, for casements, ditto ..	1s. 6d. to 3	0
Sash centres or pivots, per pair ..	6d. to 1	0
Best or patent sash line, per yard ..	0	1½
Copper sash line, per lin. foot	3d. to 1	0
Sash weights, iron, per lb.	0	1½

SHELF BRACKETS, *ornamental cast iron* (*per dozen including screws.*)

	s.	d.		s.	d.
4 x 5 ..	7	6	10 x 8	14	9
7 x 6 ..	10	6	10 x 12	23	9
8 x 6 ..	12	0	14 x 12	26	9

ARNOTT'S VENTILATORS, *leathered.*

	s.	d.
White front and bronzed	7	6
Ditto and fancy bronzed	12	0
Large size common black	12s. to 18	0

IRON AIR BRICKS.

	4½ x 3	9 x 3	9 x 6	12 x 6
Common	5d.	6d.	10d.	1s. 6d.
Galvanized ..	8d.	10d.	1s. 6d.	1s. 9d.

GRATINGS, cast iron, dished or plain, from 4 to 15 ins. square .. .. 1s. to 5s. 0d.

IRON STENCH TRAPS, from 3 ins. to 12 ins. square, from .. .. .. 1s. 6d. to 8s. 0d.

COACH BOLTS, *complete, per dozen.*

	s.	d.
1 in. long x ¼ in. diameter	0	8
1½ in. long x ¼ in. diameter	0	9
2 ins. to 8 ins. long (¼ in. dia.), from	1s. 3d. to 2	0
5-16 in. bolts, complete, from 1½ to 8 ins. long, from	1s. to 3	0
⅜ in. bolts, complete, from 1½ in. to 10 ins. long, per lb.	0	4
7-16 in., from 2 to 10 ins. long, do	0	4
½ in. from 2 to 12 ins. long, per lb	0	3½
⅝ to ¾ in., from 2 to 15 ins. do.	0	3

SUNDRIES.

	s.	d.
Furnace doors and grates for 9 to 18 in. openings, the set from	5s. to 20	0
Manilla rope, per cwt.	68	0
Blasting powder by the keg, per lb. ..	11d. to 1	0
Fuse, per coil	10d. to 1	0

The strength of the best Manilla ropes varies as much as rod or bar iron, portions of the same rope will sometimes vary 20 per cent. Exposure for two or three months to bad weather when the ropes are alternately wet or dry weakens them rapidly reducing their strength to one half. Tarring ropes also weakens them, the best preservative is to keep them dry and under cover.

Rope, Weight and Strength.

Rule.—For weight in pounds per fathom of three-strand hemp rope, square the girt and multiply result by ·26.

Breaking strain in cwts., square the girt and multiply result by 5·6. Thus, a 3-inch rope would weigh 2 34 lbs. per fathom, and the breaking strain be 50·4 cwts.

Example $3^2 = 3 \times 3 = 9$.

$9 \times \cdot 26 = 2\ 34$, the weight in lbs. per fathom.

then $9 \times 5{\cdot}6 = 50{\cdot}4$, breaking strain in cwts.

Best Quality Manilla Ropes.

Weight per fathom.	14oz.	1¼lb.	2¼lbs.	2¾lbs.	3½lbs.	4½lbs.	5½lbs.	6½lbs.	7½lbs.
Girt in inches	2	2½	3	3½	4	4½	5	5½	6in.

Best Galvanized Wire Rope.

Weight per fathom	1lb.	1lb. 8oz.	3lbs. 8oz.	5lbs. 8oz	7lbs.	12.bs.
Girt in inches	1	1½	2	2½	3	3½

WEIGHT AND STRENGTH OF SHORT LINK CHAINS.

	in.	in.	in.	in.	in.	in.	in.
Diam of iron links	5-16	6-16	7-16	8-16	9-16	10-16	11-16
Weight per fathom	5½lbs	8lbs.	11lbs.	14lbs.	18lbs.	23lbs.	28lbs.
Proof strain in cwts.	25½	36¾	51¼	65½	85	102	127
Diam. of iron links	¾	13-16	⅞	15-16	1	1⅛	1¼
Weight in lbs. per fathom	32	38	44	50	56	71	87
Proof strain in cwts.	147	177	200	236	268	334	408

To find the weight which ordinary short-link chains will bear with safety :—

Multiply the square of the diameter (reckoned in 16ths of an inch) by ·035 ; the product will be the weight in tons. Thus, in the case of a ¾-inch chain ¾=12-16ths, and 12 x 12=144 ; then 144 x ·035 =5·04, say 5 tons—the safe working strain. If the squares are divided by 28, a similar result is obtained. Thus, 144 divided by 28=5·14.

Example.—½ in. chain (8-16) = 8 x 8 = 64 x ·035 = 2·24 tons which is the safe working strain of a half-inch chain.

Hemp Rope.		Wire Rope of Equal Strength.			
Girt in inches.	Lbs weight p. fathom.	Girt in inches.	Lbs weight p. fathom	Breaking strain, tons	Working load, cwt.
$2\frac{5}{8}$	2	1	1	2	6
$3\frac{3}{4}$	4	$1\frac{5}{8}$	2	4	12
$4\frac{1}{2}$	5	$1\frac{7}{8}$	3	6	18
$5\frac{1}{2}$	7	$2\frac{1}{8}$	4	8	24
6	9	$2\frac{3}{8}$	5	10	30
$6\frac{1}{2}$	10	$2\frac{5}{8}$	6	12	36
7	12	$2\frac{7}{8}$	7	14	42
$7\frac{1}{2}$	14	$3\frac{1}{8}$	8	16	48
8	16	$3\frac{3}{8}$	9	18	54
$8\frac{1}{2}$	18	$3\frac{1}{2}$	10	20	60
$9\frac{1}{2}$	22	$3\frac{3}{4}$	12	24	72
10	26	4	14	28	84
11	30	$4\frac{3}{8}$	16	32	96

Railway Rates (*N. S. Wales*).

Carriage of Building Materials.

Special Class, A and B.

(A) Asphalte (in bags), Coke (owner's trucks), Drain Pipes, Earthenware Tiles, Lime, Pailings, Posts and Rails.

Timber.—*Railway Sleepers* hardwood (in logs), if by measurement will be charged at 30 cu. ft. to the ton; other woods, 40 cu. ft. per ton; sawn timber and battens, over 2 ins. thick and not more than 14 ft. long, a rate with 25 p. c. added, if more than 14 ft. long a rate with one-third added; boards not more than 2 ins. thick and 14 ft. long, a rate with 50 p. c. extra, if more than 14 feet long a rate with two-thirds added; shingles and laths.

Slates, terra cotta and fire-clay blocks.

In truck loads, not exceeding 6 tons, rate per truck per mile:—

Miles not exceeding...	100	150	200	300	400	500
Pence per ton per mile	7·02	5·84	5·24	4·51	4·02	3·70

Any quantity over 6 tons in one truck will be charged *pro rata*.

Ex.—Rate between Bathurst and Sydney 145 miles = *5·95, x 145 = 863 ÷ 12 = 71s. 11d. *Adding the proportional difference.

(B) Cement, marble dust, plaster of Paris (B rates, with 50 p. c. added; coke, tesselated and ornamental tiles, whiting, and chimney pots.

These exceptionally low rates will not be charged unless the goods are carried at owner's risk. Loading and unloading to be done by owner or charged at 1s. per ton.

All other charges in above classes (A and B) will be carried in quantities of not less than one ton, under one ton to be charged as one ton, or subject to first-class rates on actual weight.

Lime will be carried only in quantities of 4 tons and over; smaller quantities will be charged as 4 tons, or subject to first-class rates.

MILEAGE RATES FOR GOODS AT PER TON FOR 15 MILES AND AT PER TON PER MILE FOR LONGER DISTANCES.

Distance Miles.	Special Classes.		Miscellaneous.	Whole distance Minimum.	Classes.			
	A	B			1st.	2nd.	3rd.	4th.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1 to 7*	1 6	2 5	2 6	1 0	4 6	5 6	8 0	10 0
15	2 0	3 0	1 6	1 0	6 0	7 0	9 0	12 0
	Pence.	Pence.	Pence.		Pence	Pence.	Pence	Pence
50	1·25	2·12	1·6	1 6	4·24	5·18	7 05	9·18
100	1·17	2 06	2·0	2 6	4·12	5·09	7·03	9·09
200	1·01	1·88	0 94	3 6	3·76	4 67	6 49	7·83
300	5·87	1·65	0·83	4 0	3·31	4·14	5 73	7 38
400	0 80	1·54	0 75	4 6	3 08	3·84	5 35	6 89
500	0 76	1·47	0 70	5 6	9·94	3·67	5 12	6 59
600	0·74	1 43	0·67	6 0	2 85	3 55	4·96	6 39
700	0·72	1·39	0 64	6 6	2 79	3 48	4 85	6·25

A reduction of 20 p. c. is allowed on 1st and 2nd class goods between Sydney and stations distant over 340 miles.

The maximum rates between Sydney and Stations over 305 miles from Sydney on the Southern and 340 miles on the South-Western Lines will be charged £5 10s. per ton.

Example.—The rate per ton, special class A, from Sydney to Blayney, 172 miles = 172 x †1·05 = 180 ÷ 12 = 15s.

*For Northern Railway only. †Adding the proportional difference.

CLASSIFICATION OF GOODS.

FIRST CLASS.—Dobbins (railway contractors'), Iron (corrugated in cases), maximum £18 per truck not exceeding 6 tons. Permanent way railway and tramway materials (rails and fastenings,' Plasterers' hair, tar and pitch, wheelbarrows (railway contractors').

Wire (fencing in bundles), maximum, £18 per truck, not exceeding 6 tons.

N.B.—Quantities of less than 20 cwt. will be charged as one ton or at second class rates.

Goods charged by measurement (except otherwise mentioned), 80 cubic feet to the ton,

SECOND CLASS.—Boilers.—IRON—bar, rod, angle and T.: boiler plate or sheet: castings (if over 3 tons) at owner's risk only; nails, gal. screws and washers; gal. iron tanks (by measurement 160 cu. ft. to the ton); Girders, Lead (pig and sheet); stone (carved); zinc and tin plates.

THIRD CLASS.—Carpentry, joinery, ironmongery, and hardware; machinery of all kinds and rope.

FOURTH CLASS.—Naptha, plate glass in cases; slate slabs for billiard tables.

First, second, third, and fourth class goods in truck loads (not exceeding 6 tons) from Sydney to stations on the Southern and South Western Lines, 305 miles from Sydney will be charged £20 per truck.

MISCELLANEOUS CLASS.—Subject to a minimum of 5 tons per truck. To be handled by owner: 1s. per ton will be charged if unloaded by the Department; bricks, clay; IRON, pig, pipes and rough castings from the Foundry, and scrap-iron; Ironstone, limestone, marble (undressed); road metal, sand, Stone (undressed) and cut for building or grindstones.

In truck loads not exceeding 6 tons. Rate per truck per mile :—

Miles (not exceeding) ...	120	160	200	300	400	500
Pence per ton per mile ...	5·78	5·13	4·72	4·06	3·62	3·35

Ex.—Rate to S. Wagga from Sydney, 309 miles =309 x *4·02 = 1238 ÷ 12 = 103s. 2d. *By deducting the proportional difference.

Long and bulky articles.—For articles requiring one large or two ordinary trucks, no less charge than for three tons will be made, and when more than two trucks are required the least charge will be two tons for each truck used, including dummies.

Gunpowder and other Explosives are taken at owners' risk, who are also liable for all damage done by same. Their nature must be conspicuously made known, &c., under a penalty not exceeding £50. The packages must be close jointed or secure and must not contain more than 100 lbs., and must be taken delivery of within 24 hours after arrival. No explosive to be brought to any station without permission of traffic manager or station master, and then only at certain times on certain days, which can be ascertained on application, together with other particulars too voluminous to be stated here.

N.B.—The above Abstract is given to enable contractors to compile Estimates of approximate cost of Freight when tendering for the erection of country buildings, &c. Fuller particulars, regulations and conditions, with forms of consignments notes, &c., are given in a Pamphlet issued by the Government, 63 pages royal octavo, price 2d.

COKE.—I have included coke in the list of building materials, because it is the best and one of the cheapest materials for concrete, especially for arches where lightness is required.

Building Materials.

	s.	d.
Bags and sacks, per doz....	1	0
Cordage, rope, per ton ...	40	0
Steel rope, per ton ...	60	0
Cement (Portland and Keene's), per barrel ...	2	0
Doors, sashes, shutters (iron or steel), each ...	1	0
Powder (blasting), including dynamite and lithofracteur, per lb... ..	0	1
Turpentine, including liquid resin, dryers, and painters' spirit, per gal.	1	0
Varnish of all kinds, including French polish, per gallon	2	0
Timber, dressed, 100 sup. feet	2	0
Ditto, rough undressed, 100 sup. feet	1	0
Paints, per ton	40	0
Corrugated iron, galvanized in bars, bundles, and sheets, per ton ...	40	0
Nails, iron, copper, zinc, or brass, per cwt. ...	2	0
Manufactured iron, per cwt.	3	0
Iron wire, per ton ..	20	0
Oils (except animal), black or sperm, per gallon ...	0	6

VICTORIAN TARIFF, 1886.

Building Materials.

	s.	d.
Bricks, fire, p. 1000 ...	20	0
Paperhangings, p. cwt ...	4	0
Coir rope, per cwt. ...	5	0
Hempen and other cordage (except of galvanized and other iron and steel), per cwt... ...	11	3
Doors, wooden, each ...	5	0
Window sashes, per pair...	2	0
Iron nails (except for trunks and grindery), per cwt....	3	0
Blasting powder, per lb...	0	1
Dynamite and lithofracteur, per lb.	0	4
Fuse, per coil of 24 ft. or less, per coil	0	1½
Varnish, including lithographic, per gallon ...	2	0
Paints, ground in oil, per ton	40	0
Ditto, mixed ready for use, per ton...	80	0
Cast iron pipes, per ton ...	40	0
Timber (dressed or planed) per 100 sup. feet ...	1	6
Ditto, undressed hardwood, except undressed logs of any length, if 9 inches square or larger, per 100 sup. feet ...	1	0
Laths, per 1000	1	0
Shingles per 1000 and palings, per 100 ...	0	9
Lead, sheet and piping, per cwt.	2	6
Oils, animal and vegetable, other than black, cocoa nut, cod, or palm, per gallon	0	6
Manufactures of metals (excepting steel cranks and tires in the rough and patent roller bushes for block making), *ad valorem*	25 per cent.	

BUILDING MATERIALS.

	s.	d.		s.	d.
Galvanized iron, per cwt.	2	0	Turpentine and mineral oils, per gallon	0	6
Glue, per lb.	0	2	Sashes, per pair	2	6
Iron castings (for building purposes), wire and nails, per cwt.	2	0	Machinery for sawing, *ad. val*. 5 p. c.		
Ditto tanks, each ..	8	0	Timber in logs or undressed, p. 100 sup. ft. 1 in. thick	1	0
Cement, per barrel ...	2	0			
Lead (red and white) and paints, per cwt. ...	2	0	Timber, dressed do. ...	1	6

EXEMPTIONS.—Chain cables, over ⅜ of an inch diameter, iron (plain sheet), not including galvanized, bar, rod, or sheet iron ; Lead (pig and sheet), Muntz metal. Export duty on all log cedar per 100 sup ft., 1 in. thick, 2s.

SOUTH AUSTRALIAN TARIFF, 1886.

BUILDING MATERIALS.

	s.	d.		s.	d.
Cement, per barrel ..	2	0	Oils, turpentine, naptha, and varnish (except cod and whale oils, per gallon	0	6
Doors and frames each, and sashes, per pair ...	4	0			
Iron corrugated, galvanized, unmanufactured p ton	30	0	Wood, battens, deals, and planks, quartering, spars 40 cubic feet	2	6
Iron columns, iron girders and pipes, per ton ...	40	0	Boards ⅞ in. to 1½ in. rough or planed, tongued or grooved, per 100 sup. ft.	1	6
Lead (pipe and sheet), per cwt.	2	6	Architraves, skirtings, mouldings, 100 lin. ft...	1	6
Nails, screws and paints, per cwt....	2	0	Laths, 1000	1	0
Marble, slate and building stone, unwrought, per cubic foot	0	6	Palings, per 100, shingles per 1000	0	6
Plaster of Paris, per barrel	3	0			

WESTERN AUSTRALIA TARIFF, 1886

BUILDING MATERIALS.

	s	d.
Blasting powder per lb	0	0½
Turpentine, per gal.	0	6
Lead per cwt. (sheet, pig, and piping)...	2	6
Iron, cor. galvanized, per cwt.	2	0
Iron, wire and hoop	1	0

On drain pipes, tiles, iron pipes ; bar, bolt, sheet and plate iron, gal. sheet iron, 5 per cent, *ad valorem*.

BUILDING MATERIALS.

	s.	d.
Planed boards of every description, including tongued and grooved, per 100 sup. ft... ...	5	0
Buckets, each	0	3
Rough iron castings, per cwt. gross	1	0
Cements, mineral, whiting and plaster of Paris per cwt.	0	9
Powder, blasting, per lb..	0	1
Oils of all kinds (except fish oils), per gallon ...	1	0
Rope of every description (except galvanized iron wire rope,) per cwt. ..	1	6
Sawn timber, under 3 ins. per 100 sup. feet ..	2	6
Iron fencing, Grindstones, per cwt...	0	9
Lead, milled, sheet, and piping, per cwt ...	2	6
Red lead and white, and paints of all kinds, p lb	0	0½
Machinery of every description (not otherwise enumerated), *ad valorem*	5	p. c.
Iron nails (except screw nails), iron nuts and bolts, per cwt. gross ...	2	6
Turpentine, per gallon ...	1	0
Varnish and polish of every kind, per gallon	1	6
Galvanized iron and zinc, plate glass, Venetian blinds, paperhangings, slates, roofing and flagging, and spouting (gal. iron), screws and nails, 10 per cent. *ad valorem.*		
Architraves, doors, mouldings, sashes and skirtings made of wood, 20 p. c. *ad valorem.*		

EXEMPTIONS.—Iron bridges, chain cables of every description fire bricks, fire clay (lumps), granite in rough blocks, Iron—rod, bar hoop, sheet, plate and pig, Lead (pig), linseed oil, marble (in rough block), memorial windows for churches and chapels, ores of all kinds of metals, draining pipes (earthenware) for the conveyance of water, Iron pipes, not being galvanized, pitch, railway plant, Rolling stock and all materials which may be applied or used in the construction or maintenance of railways or tramways, Iron rivets, Rope being galvanized iron wire, Slate in blocks, steel unmanufactured, stone in rough blocks. iron tanks, tar and draining tiles.

NEW ZEALAND TARIFF, 1886.

BUILDING MATERIALS.

	s	d
Cement and plaster of Paris, per barrel ...	1	0
Doors, plain, each, and sashes, per pair	2	0
Doors, glazed, with ornamental glass, each, or sashes, per pair... ...	4	0
Glass, crown, sheet, and common window, per 100 sup. feet	2	0
Rope and cordage, per cwt	5	0
Timber, sawn rough, per 100 feet...	2	0
Timber, sawn and dressed per 100 feet	4	0
Shingles and laths, per 1000, and timber palings per 100	2	0
Ditto rails, per 100	4s.	
posts, per 100	8	0

	s.	d.
Iron fencing wire, staples, standards, straining posts, and apparatus, per cwt....	1	0
Iron gates and gate posts, per cwt.	4	0
Iron, galvanized, corrugated sheets; ridging, guttering, spouting, washers, screws, nails and wire netting, per ton	40	0
Iron spouting, cast, per cwt.	2	0
Lead and composition piping, per cwt. ...	3	6
Nails, not otherwise enumerated, per cwt. ...	2	0
Paints, mixed, ready for use, per cwt.	2	0
Turpentine, varnish and polish, per gallon ...	0	6
Iron tanks of and under 200 gallons, each ...	2	6
Iron galvanized tiles and rivets, per cwt.... ...	1	0
Whiting and chalk, lime, zinc, ridging, piping and guttering, per cwt.	1	0
Iron tanks, each	5	0
Buckets and tubs, wood or iron, paperhangings, brass manufactures, plate and colored glass, ironmongery, mantlepieces, wood mouldings, sash lines, copper and sash weights, *ad. val.*	15 per cent	

EXEMPTIONS.—Blasting powder, bolts and nuts, building materials not otherwise enumerated, iron chains, glue, Iron bridges and all materials which may be specially imported for the construction of bridges, wharves, jetties, or patent slips, Iron (common or black sheet), rod, bolt, bar, hoop and pig, Lead in pig, bars, or sheets, Machinery for boring, brick and tile making, planing, punching, sawing, turning, machine saws, metal sheaves for blocks, paints, wet or dry (other than paints mixed ready for use), railway plant and all materials which may be specially imported for the construction of railways and tramways, spades, shovels, and forks, steel, artificer's tools, waterpipes not otherwise described, all materials which may be specially imported for the purpose of constructing waterworks, zinc, plain, sheet, and all other articles not otherwise described.

QUANTITIES AND MEASUREMENTS.

In addition to the rules for measurements given under the various trades, the following *mems.* will be found useful :—

Adhere as much as possible to one system and routine of measurement, following the order pursued by the builder, &c., in actual construction.

In taking dimensions it will be found most convenient to work from left to right especially when making sketch plans with dimensions.

In excavations, foundations, or walls of a building : take the back and front and parallel walls from out to out, and the other walls in the clear.

In scaling from a plan, when the dimensions are not given, apply the reading of the scale at the end of the first dimension to the commencement of the second dimension ; repeating the operation until the scale is exhausted or the end of the scale is reached ; note these accumulated dimensions, and repeat the process until the whole of the walls required are measured.

The measurement of the length of foundation walls will be a check on the measurement of the walls forming the superstructure. These lengths can be taken for the trenches in excavation, allowing about 12 inches in the widths to enable the masons, &c., to strike the joints. As the excavation, levelling and stopping of trenches, with part refilled and rammed, are worth double or treble ordinary excavation, they must be kept separate.

Rock excavation should be reckoned by the cube yard with the stepping and levelling by the foot super.

Chimney breasts, including fireplaces, are generally reckoned solid, except the arch, hobs, &c., are allowed for separately, when the fireplace opening is deducted.

Cornices, strings, &c., are reckoned solid, the length, breadth and depth being taken.

Ovens, coppers, and furnaces are reckoned solid by the cube yard.

Facings, pointing, &c., by the yard super or square of 100 sup. feet.

Gauged arches, cuttings, &c., by the foot super.

Openings—The width is always given first and then the height ; *daylight* or the size of opening in wall being intended. If the head is curved, the height from the stone or brick sill to the centre of soffit is implied, unless stated otherwise.

Flooring may include joists at per square, or the joists may be taken at per hundred lineal feet, stating the scantling ; or per 100 sup. feet, one inch thick. If the flooring is taken net, it will form with the hearths and chimney breasts a check for the plastering or lining of ceilings, after deducting well-holes of stairs, &c. If the net measurement is taken for flooring, an addition must be made to the price to allow for loss of width by tonguing and grooving, besides short lengths and remnants too short to work in. This, with 6 x 1 T. and G. flooring, would be about ten per cent.

Chimney breasts or flues are not deducted in measuring ceilings.

The lineal measurement of facia next eaves will also give the length of eaves for slating, and the length of eaves spouting, with one foot added for each angle. The soffit, if more than 11 ins. wide, should be reckoned by the foot super.

Bracketing per super foot.—take lengths of walls by the girth of brackets.

Ribbed and other centering, per foot super.

Joinery is reckoned by the foot super or lineal foot as given under the various headings.

	Slope.	Angle of Rafter.	Angle of Hip.	Length of Rafter.	Length of Hip.	Height of Roof.
		deg. min.	deg. min.			
Rise $\frac{1}{8}$ span ...	4 to 1	14.3	10.2	1.031	1.437	.250
„ $\frac{1}{6}$ „ ...	3 to 1	18.26	13.15	1.054	1.452	.333
„ 1-5 „ ...	$2\frac{1}{2}$ to 1	21.49	15.47	1 077	1.469	.400
„ $\frac{1}{4}$ „ ..	2 to 1	26,34	19 27	1.118	1.500	.500
„ $\frac{1}{3}$ „ ...	$1\frac{1}{2}$ to 1	33.42	25.14	1 202	1.563	.667
Square roof ...	1 to 1	45.	35.16	1.414	1.732	1.000
Rise $\frac{2}{3}$ span ...	$\frac{3}{4}$ to 1	53.8	43.19	1.667	1.943	1.333
„ $\frac{3}{4}$ „ ...	$\frac{2}{3}$ to 1	56.19	46.41	1.803	2.062	1.500
Gothic roof ...		60.	50.56	2 000	2.236	1.732
Rise = span ...	$\frac{1}{2}$ to 1	63,27	54.44	2 237	2.449	2.000

MASONRY *and stonecutting.*—The remarks under these headings will include every description of stonework. In carved work the stone is cubed in the rough ; if prepared by the stonecutter, the clean chiselling or boastering is reckoned by the super. foot, to which is added the cost of carving. The setting or fixing and mortar is generally added to the cost of stone at per cube foot. All metal work, such as joggles, cramps, bolts, &c., or running in lead or sulphur is reckoned by the pound.

CARTAGE, HORSE-POWER, &C.

Cartage on bad roads per ton per mile from 2s. to 4s.
Ditto on good roads ditto ditto 1s. to 2s.
Haulage on Railways about one-tenth cost on good roads.
Freight by coasting steamers about one-fourth cost on Railways.

HORSE POWER.—Theoretically a horse is calculated to raise 33,000 lbs. one foot high per minute, or 150 lbs. raised 220 feet high per minute, and this is the data or nominal horse-power upon which the power of Engines is calculated, but in practice only two-thirds of this power can be depended on for about 8 hours per day, *e.g.*, a horse would raise 80 bricks, weighing 560 lbs. 40 feet high per minute, or 40 bricks 80 feet high in the same time.

A horse can draw ten tons on a level well laid Railway or about 6 tons on ordinary Railways, or 4 tons on a horse Railway with 6 x 3 hardwood rails.

MAN POWER.—The power of a man is generally reckoned at one-fifth that of a horse. His lifting power is about 280 lbs., or $2\frac{3}{4}$ cwt.

Among the many ways of making walls waterproof are *damp proof courses*, inserted through the walls, generally at the ground floor level. The usual method is to insert one or two courses of slates bedded in Portland cement, but as the cement is generally mixed with at least twice its bulk of sand, and by that means made porous, it will not effectually exclude the damp when laid upon a porous foundation, such as ordinary brickwork, which is now being extensively used in Sydney for foundations. It is also questionable whether slate damp-proof courses do not decay in less than 25 years. Glazed hollow tiles have also been introduced as a damp proof course, and exhibited for sale in Melbourne and Sydney for many years, but very few of them have been used. Tar mixed with ashes forms an excellent damp proof course; it is easily applied if mixed *fat* or stiff, and will not run if not exposed to heat; the indestructability of *carbon*—the chief ingredient in tar—is indisputable. Sand and ashes have been tried, but the sand will not retain the tar so as to obtain a joint at least half an inch thick, or prevent the tar overflowing the base-course. Callender and Sons' *pure bitumen damp course* has been lately introduced into Sydney, and bids fair to supersede in many cases other damp proof courses. It is said to be extensively used in Great Britain and America; it is sold in rolls 24 feet long and from 10 to 24 inches wide, and 3-16ths of an inch thick, at about 4d. per super foot. It is also used as a substitute for asphalte over brick and iron bridges on several of the English railways. It is more easily, quickly, and cheaply, applied than any other damp proof course.

The difficulty of obtaining waterproof walls will be apparent when it is known that even the Australian freestones are far from being waterproof, and will become saturated by driving rains. Bricks, except they are glazed, are much more absorbent than freestone; a common brick will take up about 1 lb. of water; the best double pressed or patent bricks absorbing about 4 ozs. each: from this it will be seen that solid brick walls are generally porous. Hollow brick walls, or double walls connected only by iron cramps or ties are waterproof, because the rain, after driving through the outer wall, runs down the space between the walls and out at the base-course or ground-floor level. This description of walling has been adopted in some of the public and private buildings near Melbourne and Sydney at a considerable extra cost as compared with ordinary brick walls. A similar result might be obtained by battening the inside of walls (or such of them as may be exposed to driving rains), the battens being lathed and plastered, leaving a small space between the laths and wall for the water to trickle down after passing through the wall. This system is often adopted in many parts of Great Britain, but I have not heard of its being used here. It would readily admit of nails being driven into the battens for pictures, brackets, hat pegs, &c., and would save the cost of cementing or painting, which are to *be deprecated as indicating inferior building materials, requiring protection from the weather*, and when used to represent other materials are simply shams.

TABLE showing the results of experiments on the properties of New South Wales and other timber :—

TIMBER.	Specific gravity or ounces per cube foot.	Elasticity or stiffness, Red Pine being 1.00.	Breaking weight in lbs. per square in., 12 in. bearing.	Ditto, or strength, Red Pine being 1.00.
Box, mean of 4 experiments ...	1,230	1.17	2,445	1.82
Iron bark, do. ...	1,211	0.91	2,288	1.70
Spotted gum, do...	1,035	1.06	2,006	1.49
Stringy bark, do...	937	0.75	1,818	1.36
Teak	745	1.31	2,462	1.84
Ash	760	0.89	2,026	1.50
Canadian oak ...	872	1,16	1,766	1.32
English oak ...	934	0.79	1,672	1.25
Pitch pine ...	660	0.61	1.632	1.22
Beech	852	0,74	1,556	1.16
Red pine	657	1.00	1,341	1.00
Riga fir	753	0.72	1,108	0.83
Elm	553	0.38	1.013	0.75

The first series of experiments were made at the Sydney Mint by the Commissioner of Railways in August, 1858.

The second series of experiments are taken from "Barlow on the Strength of Timber and Iron," and show the mean of three experiments on each description of timber, the samples being selected from Woolwich Dockyards.

The following Table is calculated from formulæ given by Barlow, viz. $W = \frac{4\ A\ D^2\ S}{L}$ in which W represents the breaking weight in lbs. of a piece of timber, A being its breadth, D its depth, L its length or bearing, and S the tabular strength of each square inch in sectional area : the value of S for different kinds of timber is given in the above table, where we find red pine to be 1,341. The result of the above formulæ may also be stated in cwts., thus $W = \frac{4\ A\ D^2\ 1{,}341}{12 \times 112} = 4\ A\ D^2$ and lastly $\frac{W}{4}\ A\ D^2$ the result given in the following table, from which may be ascertained the strength of any scantling, of timber, by multiplying the result, given in the following table, by the proportions stated in the fourth column of the above table, which I have cast out for this purpose.

EXAMPLE.—One-fourth of the breaking weight of a piece of red pine 14 inches deep by 12 inches in width, with a clear bearing of 20 feet, is shown by the following table to be 117.6 cwt. (see example at the end of table) this multiplied by 1.82 will be 214. cwt., equal to one-fourth of the breaking weight of box, the weight being applied in the centre of a beam or $\frac{1}{8}$ of the breaking weight if distributed equally over the beam, as in a girder for a floor, shop window, &c.

TABLE SHOWING THE STRENGTH OF RED PINE TIMBER.

The weights in this Table are—$\frac{1}{8}$th of the breaking weight of different scantlings, having 1 foot bearing, uniformly loaded; or $\frac{1}{4}$th of the same when suspended in the middle.

RULE.—To ascertain the strength of a piece of timber: Divide the third or cwt. column by the length or bearing of the timber, and the weight in cwts. will be obtained.

Depth.		Breadth.		Cwt.
1½	by	1	...	2·2
		1½	....	3 4
		2	...	4·5
		3	...	6 7
		4	...	9·0
		5	...	11·2
		6	...	13 5
		7	...	15·7
		8	...	18·0
		9	...	20·2
		10	...	22·5
		11	...	24·7
		12	...	27·0
2	by	1½	...	6·0
		2	...	8·0
		3	...	12·0
		4	...	16·0
		5	...	20·0
		6	...	24·0
		7	...	28·0
		8	...	32·0
		9	...	36·0
		10	...	40·0
		11	...	44·0
		12	...	48·0
3	by	2	...	18 0
		2½	...	22 5
		3	...	27 0
		4	...	36·0
		5	...	45·0
		6	...	54·0
		7	...	63·0
		8	...	72·0
		9	...	81·0
		10	...	90 0
		11	...	99 0
		12	...	108·0
4	by	2	...	32·0
		2½	...	40 0
		3	...	48·0
		3½	...	56·0
4	by	4	...	64·0
		5	...	80 0
		6	...	96·0
		7	...	112·0
		8	...	128·0
		9	..	144·0
		10	...	160·0
		11	...	176·0
		12	...	192·0
5	by	2	...	50·0
		2½	...	62·5
		3	...	75·0
		3½	...	87·5
		4	...	100·0
		5	...	125·0
		6	...	150·0
		7	...	175 0
		8	...	200 0
		9	...	225·0
		10	...	250·0
		11	...	275·0
		12	...	300 0
		13	...	325 0
		14	...	350·0
		15	...	375·0
6	by	2	...	72·0
		2½	...	90·0
		3	...	108·0
		3½	...	126·0
		4	...	144·0
		5	...	180·0
		6	...	216·0
		7	...	252 0
		8	...	288·0
		9	...	324·0
		10	...	360·0
		11	...	396·0
		12	...	432·0
		13	...	468·0
		14	...	504·0
		15	...	540 0
7	by	2	...	98·0
		2½	...	122 5
		3	...	147·0
		3½	...	171·5
		4	...	196 0
		5	...	245 0
		6	...	294 0
		7	...	343·0
		8	...	392 0
		9	...	441·0
		10	...	490 0
		11	...	539·0
		12	...	588·0
		13	...	637·0
		14	...	686·0
		15	...	735·0
8	by	2	...	128·0
		2½	...	160·0
		3	...	192 0
		3½	...	224·0
		4	...	256 0
		5	...	320·0
		6	...	384·0
		7	...	448 0
		8	...	512·0
		9	...	576·0
		10	...	640·0
		11	...	704·0
		12	...	768·0
		13	...	832·0
		14	...	896·0
		15	...	960·0
9	by	2	...	162·0
		2½	...	202·0
		3	...	243·0
		3½	...	283·5
		4	...	324·0
		5	...	405·0
		6	...	486·0
		7	...	567·0
		8	...	648·0
		9	...	729·0

Table of the Strength of Red Pine (*continued*).

Depth.	Breadth.	Cwt.
9 by	10 ...	810·0
	11 ...	891·0
	12 ...	972·0
	13 ...	1053·0
	14 ...	1134·0
	15 ...	1215·0
10 by	2 ...	200·0
	2½ ...	250·0
	3 ...	300·0
	3½ ...	350·0
	4 ...	400·0
	5 ...	500·0
	6 ...	600·0
	7 ...	700 0
	8 ...	800 0
	9 ...	900·0
	10 ...	1000·0
	11 ...	1100·0
	12 ...	1200·0
	13 ...	1300·0
	14 ...	1400·0
	15 ...	1500·0
11 by	2 ...	242·0
	2½ ...	302·5
	3 ...	363·0
	3½ ...	423·5
	4 ...	484·0
	5 ...	605·0
	6 ...	726·0
	7 ...	847·0
	8 ...	968·0
	9 ...	1089·0
	10 ...	1210·0
	11 ...	1331·0
	12 ...	1452·0
	13 ...	1573·0
	14 ...	1694 0
	15 ...	1815·0
12 by	2 ...	288·0
	2½ ...	360·0
	3 ...	432·0
	3½ ...	504·0
	4 ...	576·0
	5 ...	720·0
	6 ...	864·0
	7 ...	1008 0
	8 ...	1152·0
	9 ...	1296 0
	10 ...	1440 0
	11 ...	1584·0
	12 ...	1728·0
	13 ...	1872·0
	14 ...	2016·0
	15 ...	2160·0
13 by	2 ...	338·0
	2½ ...	422·5
	3 ...	507·0
	3½ ...	591·5
	4 ...	676·0
	5 ...	845 0
	6 ...	1014·0
	7 ...	1183·0
	8 ...	1352·0
	9 ...	1521·0
	10 ...	1690·0
	11 ...	1859·0
	12 ...	2028·0
	13 ...	2197·0
	14 ...	2366·0
	15 ...	2535·0
14 by	2 ...	392·0
	2½ ...	490·0
	3 ...	588·0
	3½ ...	686 0
	4 ...	784·0
	5 ...	980·0
	6 ...	1176·0
	7 ...	1372·0
	8 ...	1568·0
	9 ...	1764·0
	10 ...	1960·0
	11 ...	2156·0
	12 ...	2352·0
	13 ...	2548·0
	14 ...	2744·0
	15 ...	2940·0
15 by	2 ...	450·0
	2½ ...	562·5
	3 ...	675·0
	3½ ...	787·5
	4 ...	900·0
	5 ...	1125·0
	6 ...	1350·0
	7 ...	1575 0
	8 ...	1800 0
	9 ...	2025·0
	10 ...	2250 0
	11 ...	2475·0
	12 ...	2700·0
	13 ...	2925 0
	14 ...	3150·0
	15 ...	3375·0
16 by	2 ...	512·0
	2½ ...	640 0
	3 ...	768·0
	3½ ...	896·0
	4 ...	1024·0
	5 ...	1280·0
	6 ...	1536 0
	7 ...	1792 0
	8 ...	2048·0
	9 ...	2304·0
	10 ...	2560·0
	11 ...	2816·0
	12 ...	3072 0
	13 ...	3328 0
	14 ...	3584·0
	15 ...	3840·0
	16 ...	4096 0

Example.

Required the strength of a piece of timber 20 feet clear bearing, and 14 inches deep by 12 inches wide.

Opposite the scantling 14 by 12 will be found 2352·0 cwt. Divide this by 20 feet and the result will be 117·6 cwt.

The comparative strength of various scantlings may also be seen at a glance.

Also the comparative strength of a piece of timber laid flatwise, and another of the same dimensions on edge.

The above Table is founded on experiments made by Barlow, author of the celebrated work on the "Strength of Timber and Iron."

Strength of Ironbark and Stringybark.

The remarks at the head and foot of last Table apply also to this—
D signifies depth and B breadth.

D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.	D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.	D. B. in. in.	Iron-bark. cwt.	Stringy-bark. cwt.
2 by 1½	10.2	8.2	5 by 2	85	68.	7 by 5	417	333.
2	13.6	10.9	2½	106	85.	6	500	400.
3	20.4	16.3	3	128	102.	7	583	466.
4	27.2	21.8	3½	149	119.	8	666	533.
5	34.0	27.2	4	170	136.	9	750	600.
6	40.8	32.6	5	213	170.	10	833	666.
7	47.6	38.1	6	255	204.	11	916	733.
8	54.4	43.5	7	298	238.	12	1000	800.
9	61.2	49 0	8	340	272.	13	1083	866.
10	68.0	54.4	9	383	306.	14	1166	933.
11	74.8	59.9	10	425	340.	15	1250	1000.
12	81.6	65.3	11	468	374.			
			12	510	408.	8 by 2	228	174
3 by 2	30.6	24.5	13	553	442.	2½	272	218
2½	38.2	30.6	14	595	476.	3	326	261
3	45·9	36.7	15	638	510.	3½	381	305
4	61.2	49.0				4	435	348
5	76.5	61.2	6 by 2	122	98.	5	544	435
6	91.8	73.4	2½	153	122.	6	653	522
7	107	85.7	3	184	147.	7	762	609
8	122	97.9	3½	214	171.	8	870	696
9	138	110.	4	245	196.	9	979	783
10	153	122.	5	306	245.	10	1088	870
11	168	135.	6	367	294.	11	1196	957
12	184	147.	7	428	343.	12	1306	1044
			8	490	392.	13	1414	1132
4 by 2	54.4	43.5	9	551	441.	14	1523	1219
2½	68.0	54.4	10	612	490.	15	1632	1306
3	81.6	65.3	11	673	539			
3½	95.2	76.2	12	734	588	9 by 2	275	220
4	109	87.1	13	796	636	2½	343	275
5	136	109.	14	857	685	3	413	330
6	163	131.	15	918	734	3½	482	386
7	190	152.				·4	551	441
8	218	174.	7 by 2	167	133.	5	689	551
9	245	196.	2½	208	167.	6	826	661
10	272	218.	3½	250	200.	7	964	771
11	299	239.	3	292	233.	8	1102	881
12	326	261,	4	333	267.	9	1239	991
						10	1377	1101

STRENGTH OF IRONBARK AND STRINGYBARK.—*Continued.*

The remarks at the head and foot of last Table apply also to this—
D signifies depth and B breadth.

D. in.	B. in.	Iron-bark. cwt.	St'ngy-bark. cwt.
9 by	11	1515	1212
	12	1652	1322
	13	1790	1432
	14	1928	1542
	15	2066	1652
10 by	2	340	272
	2½	425	340
	3	510	408
	3½	595	476
	4	680	544
	5	850	680
	6	1020	816
	7	1190	952
	8	1360	1088
	9	1530	1224
	10	1700	1360
	11	1870	1496
	12	2040	1632
	13	2210	1768
	14	2380	1904
	15	2550	2040
11 by	2	411	329
	2½	514	411
	3	617	494
	3½	720	576
	4	823	658
	5	1029	823
	6	1235	987
	7	1440	1152
	8	1646	1316
	9	1851	1481
	10	2057	1646
	11	2263	1810
	12	2468	1975
	13	2674	2139
	14	2880	2304
	15	3085	2468
12 by	2	490	39 2
12 by	2½	612	490
	3	734	588
	3½	856	685
	4	979	783
	5	1224	979
	6	1468	1175
	7	1714	1371
	8	1958	1567
	9	2203	1763
	10	2448	1958
	11	2693	2154
	12	2938	2350
	13	3182	2546
	14	3427	2742
	15	3672	2938
13 by	2	575	460
	2½	718	575
	3	862	690
	3½	1006	804
	4	1149	919
	5	1437	1149
	6	1724	1379
	7	2011	1609
	8	2298	1839
	9	2586	2069
	10	2873	2298
	11	3160	2528
	12	3448	2758
	13	3735	2988
	14	4022	3218
	15	4310	3448
14 by	2	666	533
	2½	833	666
	3	1000	800
	3½	1166	933
	4	1333	1066
	5	1666	1333
	6	1999	1599
	7	2332	1866
	8	2666	2132
14 by	9	2999	2399
	10	3332	2666
	11	3665	2932
	12	3998	3299
	13	4332	3465
	14	4665	3732
	15	4998	3998
15 by	2	765	612
	2½	956	765
	3	1148	918
	3½	1339	1071
	4	1530	1224
	5	1913	1530
	6	2295	1836
	7	2678	2142
	8	3060	2448
	9	3443	2754
	10	3825	3060
	11	4208	3366
	12	4590	3672
	13	4973	3978
	14	5355	4284
	15	5738	4590
16 by	2	870	696
	2½	1088	870
	3	1306	1044
	3½	1523	1219
	4	1741	1393
	5	2176	1741
	6	2611	2089
	7	3046	2437
	8	3482	2785
	9	3917	3133
	10	4352	3481
	11	4787	3830
	12	5222	4178
	13	5668	4526
	14	6093	4874
	15	6528	5222
	16	6963	5571

N.B.—In using the tables showing the strength of Baltic red pine, Iron bark and Stringy bark, the length of the bearers should not exceed 24 times their depth.

Strength of Spotted Gum and Box.

The remarks at head and foot of the first Table apply also to this—
D signifies depth and B breadth.

D in.	B. in.	Spotted Gum cwt.	Box. cwt.	D. in.	B. in.	Spotted Gum. cwt.	Box. cwt.	D in.	B. in.	Spotted Gum. cwt.	B ox. cwt.
2 by	1½	9.1	10.9	5 by	2	76	91	7 by	5	375	450
	2	12.2	14 6		2½	95	114		6	450	540
	3	18.3	21.9		3	115	138		7	524	629
	4	24.3	29 1		3½	134	161		8	599	718
	5	30.6	36.7		4	153	183		9	675	810
	6	36 7	44.0		5	191	229		10	749	898
	7	42.8	51 3		6	229	275		11	824	989
	8	48 9	58.6		7	268	321		12	900	1080
	9	55.1	66.1		8	306	367		13	974	1168
	10	61.2	73.4		9	344	413		14	1049	1258
	11	67.3	80.7		10	382	458		15	1125	1350
	12	73.4	88.1		11	421	505				
					12	459	551				
					13	497	596	8 by	2	201	241
3 by	2	27.	33.		14	535	642		2½	245	294
	2½	34.4	46 3		15	574	689		3	293	351
	3	41.3	49.5						3½	343	411
	4	55.1	66.1						4	391	469
	5	68.8	82.4	6 by	2	110	132		5	489	586
	6	82.6	99 1		2½	137	164		6	587	767
	7	96.3	105.5		3	165	198		7	685	822
	8	109.9	131.8		3½	192	230		8	783	939
	9	124.	149.		4	220	264		9	881	1057
	10	137.	164.		5	275	330		10	979	1175
	11	151.	181.		6	330	396		11	1076	1291
	12	165.	198.		7	385	462		12	1175	1410
					8	441	529		13	1273	1527
					9	496	595		14	1376	1651
4 by	2	50	60		10	551	661		15	1469	1763
	2½	61	73		11	606	727				
	3	73	88		12	661	793	9 by	2	247	296
	3½	86	103		13	716	859		2½	309	370
	4	98	118		14	770	924		3	371	445
	5	122	146		15	826	1091		3½	434	521
	6	147	176						4	496	595
	7	171	205						5	620	744
	8	196	235	7 by	2	150	180		6	743	891
	9	220	264		2½	187	224		7	867	1042
	10	245	294		3	225	270		8	991	1189
	11	269	323		3½	262	314		9	1115	1338
	12	293	352		4	300	360		10	1239	1486

Strength of Spotted Gum and Box.

The remarks at the head and foot of the first Table apply also to this
D signifies depth and B breadth.

D. in.	B. in.	Spotted Gum. cwt.	Box. cwt.
9 by	11	1363	1635
	12	1487	1784
	13	1561	1873
	14	1736	2083
	15	1859	2231
10 by	2	306	367
	2½	382	458
	3	459	551
	3½	535	642
	4	612	734
	5	765	918
	6	918	1101
	7	1071	1285
	8	1224	1469
	9	1377	1632
	10	1530	18 6
	11	1683	2019
	12	1836	2203
	13	1989	2387
	14	2142	2570
	15	2295	2754
11 by	2	370	444
	2½	462	554
	3	555	666
	3½	648	777
	4	740	888
	5	926	1111
	6	1106	1327
	7	1296	1555
	8	1481	1777
	9	1666	1999
	10	1851	2221
	11	2036	2443
	12	2221	2665
	13	2406	2887
	14	2592	3110
	15	2776	3331
12 by	2	441	529
12 by	2½	551	661
	3	661	795
	3½	770	924
	4	881	1057
	5	1101	1321
	6	1321	1565
	7	1542	1850
	8	1762	2114
	9	1983	2379
	10	2203	2643
	11	2423	2907
	12	2644	3173
	13	2864	3437
	14	3084	3701
	15	3305	3866
13 by	2	517	620
	2½	646	775
	3	726	871
	3½	905	1086
	4	1031	1241
	5	1293	1541
	6	1551	1861
	7	1810	2172
	8	2068	2481
	9	2327	2792
	10	2585	3102
	11	2844	3413
	12	3103	3723
	13	3361	4033
	14	3620	4344
	15	3879	4655
14 by	2	600	720
	2½	750	900
	3	900	1080
	3½	1049	1259
	4	1200	1440
	5	1500	1800
	6	18 0	2160
	7	2099	2519
	8	2399	2878
14 by	9	2699	3238
	10	2999	3599
	11	3298	3957
	12	3648	4377
	13	3898	4677
	14	4198	5037
	15	4498	5397
15 by	2	068	825
	2½	860	1032
	3	1033	1239
	3½	1205	1446
	4	1377	1652
	5	1721	2065
	6	2065	2478
	7	2410	2892
	8	2754	3305
	9	3098	3717
	10	3442	4130
	11	3787	4542
	12	4131	4955
	13	4475	5 70
	14	4819	5782
	15	5165	6196
16 by	2	783	939
	2½	979	1174
	3	1025	1220
	3½	1371	1645
	4	1567	1880
	5	1958	2349
	6	2350	2820
	7	2741	3289
	8	3133	3759
	9	3575	4290
	10	3916	4699
	11	4308	5169
	12	4700	5640
	13	5097	6116
	14	5483	6579
	15	5875	7050
	16	6267	7520

BUILDING MATERIALS, OF NEW SOUTH WALES.

—:o:—

Many of the following Exhibits were in the Sydney International Exhibition. 1879.

FREESTONE.

SANDSTONE (free), suitable for building, was exhibited from Sydney and suburbs, and also from Willoughby, Manly, Brisbane Water, Lithgow Valley and Parramatta. These are from the same geological formation as the Coal Measures and therefore similar to the Sydney (free) sandstone, so largely used in the best buildings of Sydney, &c. Those from Manly also make good grindstones. The Sydney sandstone received a first-class award at the Victorian International Exhibition.

SANDSTONE *(Silurian)*, from Albury and Mudgee. These sandstones are harder and in smaller beds than those from the Coal Measures and may be looked for on all the goldfields. They are not so good for building blocks, being strongly laminated, or in well-defined beds, and are therefore superior as flagstones, and for this purpose were exhibited from Cookbundoon, near Goulburn; Buckingbong, near Narrandera (rough and hard flags): and Burrowa, near Yass—the latter flags being both smooth or level and very hard, were the best exhibited, and obtained only a second-class award.

Sandstone (Coal measures), from Maitland. A fine-grained freestone awarded first-class medal: from Murrurundi, a hard, close-grained, light drab sandstone was awarded a third-class medal. This kind of freestone may be looked for in the Hunter River district and also on the Macquarie River, at and above Dubbo.

SLATE.

(Silurian or goldfield's formation), from Kerrawary, near Goulburn. Third-class award.

Cookbundoon Slate....The verandah of Dr. Moore's house in Elizabeth-street, Sydney, was paved with this slate about 6 years ago, and may now be seen.

South Gundagai Slate.—A superior kind of slate is found here, and is worked by the Australian Slate Company.

Bathurst.—A slate quarry was opened in 1881 at Millamurrah, near Bathurst, and 18,000 slates taken out, and machinery obtained to work the quarry on a large scale.

Slate of different degrees of hardness is found on all the goldfields, but little of it is fit for slabs or roofing.

BASALT OR BLUESTONE AND DIORITE.

Although not plentiful near Sydney, is generally distributed throughout the eastern half of the colony, and is well adapted for road metal, curbing and channelling, tar concrete, &c. It will be found at or near the following towns south of Sydney:—Camden, Campbelltown, Berrima, Nattai, Robertson, Murrimba, Wollondilly, and Cookbundoon Rivers: Pomeroy, near Goulburn, Crookwell,

Boorowa, Gundagai, Coolac; near Tumut, near Adelong, Tumberumba. Yarrangobi, Kiandra, Seymour, Cooma, Cathcart and Wyndham near Bombala, near Bega, near Moruya, Jervis Bay, Farnham, Kiama, Jamberoo, Macquarie Rivulet near Lake Illawarra, Pennant Hills, near Sydney. One of the finest blue metal quarries has been opened in the district of Mittagong, about two miles from the railway.

Kiama. Large quantities of blue metal are now being obtained from Kiama for use in Sydney

To the west of Sydney, basalt is found near Liverpool and Richmond, at Emu Plains near Penrith, at Rockley, Rydal, Mount Victoria, near Bathurst, Blayney, Frederic, Orange, the Canoblas, Currajong, near Parkes, and Lake Cudjullagong on the Lachlan River.

To the north-west it is found at Hill End and Tamberoora, Hargreaves, Sofa'a, Newrea, Wellington, Mudgee, Dubbo, and Rylstone, also at Crete, Grestore, Muswellbrook, Scone, Murrurundi, Wallabadah, Doughboy Hol'ow, north-west to Coonabarrabran.

To the north it is found near Gloucester, near Stroud, on the Hastings River, near Port Macquarie, West Kempsey, Nundle, Tamworth, near Walcha, near Armidale, Ura'la, Falconer, Glen Innes, near Newton Boyd, near Gordon and Tabulam on the Clarence River, Lismore, &c., on the Richmond River, the Tweed River, a'so at Deepwater on the Severn Rivers, Wellingrove, Byron, Inverell, &c.

GRANITE.

Granite was exhibited from Tamworth. There were few exhibits of granite, although it abounds in many parts of the colony, and often near goldfields, and would be useful for rubble or paving, curbing and guttering. The polished granite columns of the Post-office at Sydney are Moruya granite, obtained from a quarry opened by Mr. John Young in 1868, who has erected a jetty and made a tramway to it from the quarry, so that vessels can be quickly loaded.

Another granite quarry was opened at Moruya by McCredie Brothers, the contractors for the General Post Office extension, from which about 60 massive granite columns were obtained and were prepared at their Granite Works at Pyrmont. The columns are about 2½ feet diameter by 10½ feet long, with carved capitals.

A finer-grained granite has also been procured from Montague Island, about 20 miles south of Moruya by the same enterprising firm, who are using it with the Moruya granite for columns, &c. Blocks of granite, weighing 16 tons were brought from the above localities and used in the General Post Office, Sydney.

MARBLE.

Marble, blue and white, was exhibited from Blayney; the Mudgee marble, obtained a second-class award; there was also good marble from Tamworth.

Marulan Marble has for the last twenty years been made into very handsome mantlepieces, and is well known in Sydney.

Limestones.

Limestone, dense blue, from Port Stephens; cream colour, with brown veins from Mudgee. Limestone and marble are both converted into lime, the marble being limestones hard enough to receive a polish; there are also tertiary and tufaceous limestones, used chiefly for lime.

From the Mineral Statistics of New South Wales for 1880, I find that a grey crystalline limestone is found near Wollongong, containing:—Carbonate of lime 74.3; carbonate of magnesia 0.8; alumina 7.3; oxide of iron 3.1; phosphoric oxide, 0.4; silica 10 7; organic matter and water 3.4. This limestone when burnt gives a brownish hydraulic lime.

Bulli Purple Limestone shows a 5 foot seam.

Mountain Limestone.—The Fish River Caves, Wellington Caves, and Cavan Caves, near Yass, are in this formation; limestone is also found at Kempsey, Nundle, Murrurrundi, Scone, Copeland, Dubbo, Wyndeyer, Ironbarks, Farkes, Forbes, Crange, Cow Flat, Caloola, Tuena, near Junee, Jugiong, Yass, Goulburn, Gundagai, Adelong, Kiandra, Braidwood, Wingham, Gloucester, Stroud, Ophir, Wallerawang, Rockley, Bookham, Queanbeyan, Bombala, &c., being most prevalent in the silurian or goldfield's formation, and extensive lime kilns have lately been erected at Bowning, near Yass and Piper's Flat.

Bricks.

Fire Clay and superior bricks were exhibited from North Willoughby, North Shore, Lithgow Valley, Brisbane Water, Wollongong, Mudgee, Wallerawang, Vegetable Creek, &c., and may be looked for generally on the coal measures and the country between Berrima and the Hawkesbury River.

Bricks, *Drain Pipes and Paving Tiles.*—These articles can be produced wherever fire-clay or pottery-clay abounds: in addition to the last-named places, superior bricks, &c., were exhibited from Yass, Camperdown, Bathurst, Dapto, Sydney, Tamworth, Enfield, Armidale, Newtown, Balmain

Double-pressed bricks from Newtown were used for facing the walls, &c., of the Darlinghurst Public School, Sydney, their superior quality may be gleaned from the following results after 23 hours soakage in water, in 1883:—

	Dry.	Wet.
Vitrified white bricks	8 lbs. 2 oz.	8 lbs. 4 oz.
Double-pressed ditto, ordinary... ...	7 lbs. 11 oz.	8 lbs. 2 oz.

These two examples were made from the same clay, the difference being due to the burning.

In August, 1883, I also weighed several bricks dry and after soaking in water for 22 hours, viz:—

	Dry.	Wet.
Glazed and vitrified brick from N. Shore	7 lbs 13 oz.	7 lbs. 14 oz
Ordinary double-pressed brick	8 lbs. ½ oz.	8 lbs. 9½ oz.
Ditto from Enfield near Sydney, size 8 9-16 x 4 3-16 x 3 3-16	9 lbs. 8 oz.	9 lbs. 13 oz.
Single-pressed or common brown brick...	7 lbs. 15½ oz.	8 lbs. 8 oz,

TERRA COTTA.

TERRA COTTA of a superior class was exhibited from the Sydney potteries, Camperdown, Lithgow Valley, Albury, and Enfield.

GYPSUM.

GYPSUM (*sulphate of lime*) crystallised and amorphous or lumpy, is found in large quantities near Mount Browne goldfields. As before stated, this is easily burnt into plaster of Paris, as limestone is burnt into lime.

BUILDING TIMBER.

BUILDING TIMBER.—As soon as Australian timber becomes known, its superior qualities are appreciated, not only in Australia, but in America and Europe. The blue-gums are the largest and highest trees in the world, eclipsing the gigantic trees of California. An American writer refers to a tree planted in Algiers 15 years ago, which had attained the size of an oak 100 years old. We also learn from various sources that the eucalyptus or gum trees, have been largely planted in Italy at all elevations above the sea, and where planted near miasmitic swamps, have changed those localities into healthy spots

New South Wales, as the mother colony, is well timbered in the settled districts, within 50 miles of the coast, that is, between the coast range and the coast; many of the finest timbered districts being inaccessible to the colony generally. The exhibits of New South Wales timber in the International Exhibition at Sydney were from a few of the best known localities only, viz.:—Mudgee, the Hunter, Richmond and Clarence Rivers, Tamworth, Inverell, and Windsor to the north of Sydney, while from the south we had exhibits from Bega, Dapto, Camden, Wollongong, Illawarra, Albury, &c. Between Illawarra and Bega the finest timber is found, more especially near Ulladulla, where several vessels were built many years ago, and since then villas have been erected, containing some of the finest scantlings and flooring in the colony.

TALLOW WOOD *Eucalyptus microcorys* a favourite hardwood for joinery, such as door and window frames, balcony rails, flooring, &c., It does not shrink, warp or twist and receives a good smooth face, it is strong, compact and durable, and is found to the N. and N. W. of Sydney, &c.

Brisbane Water, or Broken Bay, about 20 miles north of Port Jackson, has for many years, supplied Sydney with immense quantities of hardwood. The following well-known timbers are obtained from this favoured locality, the remarks generally will apply to similar timber found elsewhere, the diameters given are from 3 to 6 feet above ground, and the heights to the lowest branches.

BLUE GUM (*Eucalyptus globulus*), 6 to 10 feet diameter, and barrel or trunk 80 to 100 feet. The best timbers in this district are said to be obtained from the alluvial flats, but elsewhere from the ranges. It is widely and extensively used for planking wharves, vessels, and bridges, for railway sleepers, and the construction of railway wagons and trucks, and for building scantlings or carpentry generally. See building materials of Victoria and Tasmania.

Dr. Mueller says in his Eucalyptographia that Forests of Blue Gum could be more cheaply and easily reared with quicker returns than any other forest tree.

BLACKBUTT (*Euc. pilularis*).—The best quality (like most other timbers) is found on the ranges at Lithgow, &c., where it is most free from gumveins. It is much used for flooring, but is not equal to tallow wood for this purpose: It is very durable; the best trees grow from 3 feet to 7 feet in diameter, and from 50 feet to 80 feet in the barrel. It is said to be even tougher than Ironbark, when subjected to sudden strain or concussion. When used as fencing, the posts will last about five years, and the rails about 12 years.

It is a tree of rapid growth and derives its name from its dark fibrous bark, which is blackest nearest the butt.

IRONBARK (*Grey*) grows plentifully on the ridges, size two to three feet diameter, and 60 feet in the barrel. For strength and durability it is unrivalled. See tables of relative strength, &c., pages 162, 165 and 166. It is superior to Red Ironbark and is not so easily split, both kinds are used for posts, girders, or standards of buildings, and for railway sleepers, bridges, jetties and fencing. Large quantities have been shipped to India for railway sleepers.

Eu. sideroph1oia a broad leaved Ironbark is abundant in New South Wales and Victoria.

Euc. creba is known as the narrow-leaved or Red Ironbark and is found throughout the eastern coast of Australia from Sydney northwards and in Victoria. See Building Materials of Victoria.

Euc. leucoxylon is the red flowering Ironbark the flowers resembling peach blossoms, it is not equal in durability to the other Ironbarks.

BEECH. This useful timber is chiefly used for flooring vessels, houses, balconies, &c., and is said not to shrink in seasoning or drying, as it generally shows the sap when fresh wrought, it is very rarely seasoned even when kept for years, and on that account is said not to take glue readily. Size, three or four feet in diameter, barrel 40 to 50 feet. The Crown Beech is inferior to the above.

TURPENTINE (*Syncarpia laurifolia*)—this timber is noted for its resisting the attacks of sea grubs when used as piles in wharves and jetties. It is plentiful, and has been extensively used for planking Government bridges, for railway sleepers, fencing, &c. Size, from three feet to five feet in diameter, and barrel 70 to 80 feet long. It was used in a wharf in Darling Harbour, Sydney, for piles, with the bark on, which remained on below low water mark for 23 years, when the piles were found to be perfectly sound and almost free from cobra or sea grub.

In 1870 two samples of wood from the jetty at Bulli were exhibited in Sydney, one was Ironbark, which had been under sea water for three years, and was riddled with the cobra (*terredo navalis*), the other sample was Turpentine, which had been subjected to the same test for nine years, and was found to be perfectly sound, for although the cobra had attacked it, its researches were very superficial, owing probably to the essential oil, or flavor of the wood

not being palatable to this interesting marine animal. It has been ascertained that Turpentine and Jarrah are the only two Australian timbers that will withstand the destructive effects of the cobra, and therefore if used in sea water, would effect a great saving in the non-use of copper or muntz metal sheeting, which is generally applied to preserve other kinds of timber, when used for marine purposes. Turpentine is also said to be white ant proof, and probably for the same reason

GREY GUM is a very hard and durable timber, and is considered nearly equal to Ironbark for strength and durability. Diameter, three to four feet, and height 60 to 70 feet.

SWAMP MAHOGANY (*Eucalyptus Robusta*) Red or flooded gum is found in swampy ground, it is chiefly used for underground work and is durable and plentiful at Brisbane Water. Diameter three to six feet, and height 50 feet. It has large flowers and seed vessels, grows at Manly near the lagoon, and on the flat banks of the Macquarie and other rivers.

FOREST or RED MAHOGANY is applied to building purposes, but like scrub box, is too often found hollow, to make it a favorite with the sawyers. Average diameter 2½ feet, height about 50 feet.

FOREST OAK is largely used for palings and shingles, staves of casks, &c. Average diameter 18 inches, and height 20 feet.

TEA-TREE and HONEYSUCKLE are small, stunted, and twisted, they are nevertheless tough and durable, and are chiefly used for boat knees.

MOUNTAIN ASH (*Euc. Sieberi*) is tough and light, like its English prototype, and is used for oars. It does not split well, and is therefore not suitable for staves. Average diameter three feet, and height 60 to 80 feet.

YELLOW PINE is a fine working timber, with a beautiful grain, and is well adapted for furniture, for which purpose there is a local demand. It is little known in Sydney, and therefore not appreciated. It is plentiful, and found up to 3½ feet in diameter, and from 30 to 40 feet high.

SPOTTED GUM has been found to be next to Ironbark in breaking weight, as per Tables pp. 167, 168. It has been often used for the poles of bullock drays, and for this purpose has been known to last for 14 years; as flooring boards it has lasted at least 40 years without deterioration Spotted Gum, like the English Oak, can be very easily twisted when steamed: it is also said that the *white* or *sap* changes into powder sooner than other hard woods, nevertheless I deem it of sufficient importance to require a Table, showing the strength of all useful scantlings and bearings which I have cast out for this, the 5th edition of my Price book.

BOX, so called from its resemblance to the European Box.—According to the Table on p. 167, this timber is the strongest known, except Teak, being even stronger than Ironbark; it is generally of a bright yellow colour, although sometimes of an orange tinge; it must not be confounded with the hollow scrub or bastard box, which is almost worthless for building purposes. When used for fencing, the posts are estimated to last 30 years and the rails much longer It is the best timber for sleepers, posts, standards, girders, joists &c

Lachlan or Dubbo Pine is the name given to the knotty, brittle yellow pine, found throughout the colony, west of the main or Dividing Range; it is very handsome, and sometimes of a browni h red colour; it looks well varnished or polished for church roofs and joinery. Although not strong, it is generally used for scantlings in house building, fencing, &c., in the western portions of the colony.

Red Gum, or Flooded Gum is generally found on the banks of rivers below flood level, more especially on the Murray and Murrumbidgee rivers, where it attains an immense size It is very hard and durable and so brittle as to generally break when falling; for fencing it is said to be equal to box; it is good for posts, sleepers, &c., but soon decays at the heart, and is mostly found hollow when full grown.

Stringy Bark.—This is one of our best-known timbers, and is largely used for palings, shingles, and slabs, on account of its being easily split; it is generally found on the goldfields, and attains immense height and thickness. Its comparative strength will be seen from the Tables showing the breaking weight of four of our best Timbers When used as fencing, it is said to last about 11 years for posts and about 18 for rails. It is also found in Victoria and Queensland. The stringy bark found near Sydney, as at North Shore, Manly, &c., and westward to the Dividing Range, is known as the *Euc. Capitella*, and is considered the typical stringy Bark of New South Wales.

Woollybutt *Euc. Longifolia*.—The leaves are very long and the fruit or seed vessels large. The bark is brown in young trees and paler in older ones. Dr. Mueller says it could be made into packing paper. It is widely distributed, exte ding into Queens'and and Victoria. When in bloom it is thickly covered with flowers.

Bloodwood, *Euc Corymbosa* It is called Bloodwood from the gum which exudes from it and is found in the concentric circles of the trunk. It is used for fencing, building, &c. Dr. Wools says manna is sometimes found on its leaves, and the bark is useful for its fibre. It is also found in Victoria and Queensland.

Mountain Bloodwood, *Euc. Eximia*, or smooth-bark Bloodwood. The Rev. Robert Collie, F.L.S., says it flourishes in the Blue Mountains, and along the railway beyond the first Zigzag, and may be seen covered with beautiful flowers in the early summer. The bark is more than an inch thick, of a light brown colour, rough and firm in the stem, but smooth in the branches. The wood is light in colour. The leaves are long, sometimes 8 inches in length, and are full of volatile oil.

Peppermint, *Euc. Dealbata*, is found beyond Mudgee, and is a species of Stringy Bark. The Stringy Bark of New England is another species known as *Euc. Macorryuchus*. It is a'so found in Victoria.

The superior strength of Australian hardwoods, as compared to Deal and American Pine, generally used for scantlings of floors, roofs, &c., in Great Britain and in Melbourne, has induced some of the Sydney architects to use much lighter scantlings and greater spaces than those given by Tredgold, Barlow, or Gwilt. This change was brought about mainly by the experiments made by Messrs. P. N. Russell and Co., in Sydney, in May, 1860, which are subjoined. The specimens were 1¼ inch deep, tapered at sides, the *sectional area being one square inch, the pieces experimented on were supported on hardwood bearers twelve inches apart.*

The experiments were conducted by Mr. J. W. Dunlop, in the presence of a number of gentlemen skilled or interested in such matters.

	Breaking weight, lbs.
Ironbark, average of 5 specimens	1210
Blackbutt „ 4 specimens	857
Blue Gum „ 2 specimens	759
Kauri Pine, New Zealand, 2 specimens	542
Oregon Pine, average of 2 specimens	722
Cedar, New South Wales, 2 specimens	416
American White Pine, average of 2 specimens	416

Wood Paving.—The relative suitability of the following Timbers for wood paving, will throw considerable light on their nature and properties. The blocks were 6 inches deep, 3 inches wide, and 12 inches long; they had withstood the very heavy traffic of the busiest part of King-street, Sydney, for 14 months, and when examined and reported upon by the City Surveyor, in March, 1882, were in excellent order and condition. The measurement of the loss in depth by abrasion was in all cases taken where most worn.

Amount of wear in 14 months :—	Inch.
Red Gum, N.S.W.; Blackbutt and Blue Gum, N.S.W. each	1-16
Ash and Box, N. S. Wales growth...	1-8
Brown Pine, N. S. Wales	3-16
Cedar, N. S. Wales	1-4
Baltic, European	3-8

The above trial clearly proves the economy and suitability of the Australian hardwoods for wood paving, the greatest amount of wear is scarcely appreciable. The superior character of the wood combined with the channel left between the blocks, as a foothold for the horses, are the main features in this highly successful wood paving.

RED CEDAR (*Cedrala toona*) is found in most parts of the eastern portion of the colony, being most plentiful in the Macleay and Clarence districts, north of the River Hunter. If we may judge from the fact that three million superficial feet were seized by the Government, near Nambucra, in the Macleay district in 1882, there should be a large Cedar trade carried on. For a description, &c., of this beautiful and favorite timber, I would refer to the Queensland Timbers in these Essays. The forest reserves contain but few young cedars.

WASTE.—There is a reckless waste of timber going on throughout the colony from unnecessary falling, barking, and ringbarking; also from bush fires, caused by carelessness. Most of the trees take from 50 to 100 years to come to perfection, and yet the forest reserves are only 1.89 per cent. of the area of the colony.

IRON.

Pig, rod, and bar iron, manufactured by the Eskbank Iron Company, Lithgow Valley, were exhibited at the Sydney International Exhibition, and rolled iron tramrails have since been supplied by this company in large quantities.

BUILDING MATERIALS OF VICTORIA.

GRANITES,

Grey and cream colour, from Beechworth. First-class.

Sandhurst and Mount Alexander, grey granite. The latter from Harcourt is the best. It is made into columns, polished and exported. The Sandhurst granite obtained a first-class award at the Sydney and Victorian International Exhibitions in 1879.

Granite is also obtained from Mount Eliza, Mount Martha, Plenty Ranges, Mount Blackwood, Refuge Cove, Gabo Island, &c., the latter granite is probably the hardest and most durable.

BASALT,

Or *bluestone* is the only building stone found near Melbourne; although very durable, it is not used where a light appearance or architectural effect is required. It is well adapted for foundations, basements, heavy or sombre-looking buildings, curbing and guttering; it is also sawn into flagging and landings, for which it is well suited on account of its great strength and durability. It is of volcanic or igneous origin, and forms some of the largest plains in the colony. A large quantity is exported to the adjoining colonies for steps, sills, paving, flagging, &c. For sawn bluestones, &c., see page 42.

SLATE.

Slate is found in many parts of Victoria, but with the exception of the Castlemaine slate, it is scarcely known or appreciated.

Castlemaine Slate is coming into general use for flagging, steps and sills, landings, hearths, &c., and is now largely sent to Sydney for these purposes. It is equal, on the whole, to the Welch slate.

Castlemaine grey slate, when used for hearths is stronger, cheaper, neater and more durable than the Sydney and Victorian freestones; it is said to be much stronger than Caithness flagging or sawn bluestone.

SANDSTONE.

Sandstone, suitable for building, is obtained from the various goldfields, but it is generally very hard, laminated, and often micaceous, and is therefore better adapted for flagging or flat-bedded rubble,

A soft sandstone was obtained at Bacchus Marsh, and used for the Treasury in Melbourne; also a similar sandstone from Darley, near Bacchus Marsh, which was used for the back facade of the Parliament Houses in Melbourne, both of those free sandstones are too soft and friable for permanent buildings.

Stawell Free Sandstone is obtained from the Grampian Hills, about eighteen miles from Stawell: the front of the Town Hall at Stawell is now found not to be a fair sample of this stone. It is a fine close-grained heavy sandstone, and apparently of a durable quality; but its appearance in the above building is greatly marred by particles of ironstone thinly interspersed, which, when exposed to the weather, disintegrate or wash away, running down the face of the stone and staining it: this defect is greatly modified in the best of the stone, now being obtained for the addition of a third story to the General Post Office, Melbourne. The cost of working the Stawell sandstone is about 50 per cent. more than the Tasmanian Freestone, although the difference in the whole cost of the additions is only about one eighth more, or £10,532 extra.

Barrabool Hill Free Sandstone is found near Geelong, and has been largely used there, and in building St. Paul's Cathedral, Melbourne.

LIMESTONES.

Limestones suitable for building are found near Geelong, the Waurn Ponds free limestone is the best yet discovered, and was introduced into Melbourne about 1877 from near the surface: the quarry now being fully opened, the stone is found to be much harder and was used to great advantage in building St. Paul's Cathedral, Melbourne: it is much cheaper than the Oamaru free limestone, so much used in Melbourne.

Lithographic Limestone is also found at Geelong. It is very hard, of a dark drab, and will take a polish; it is full of holes filled with composition, and is burnt into lime at Geelong.

Portland and Warrnambool Limestones are granulated and porous, they are used for building-stone or burnt into lime.

LIME.

Lime is made from the above limestones, also from limestone found at Bet Bet Creek, twenty miles from Sandhurst.

Recent or tertiary limestone is found throughout the north-western portions of the colony, between the settled districts and the Murray River, on the north, extending into South Australia on the west. It is also found at Benalla and the Delegate River.

On or near the coast limestone is found at Belfast, Cape Otway, Western Port, Cape Patterson, Cape Liptrap, Lake Victoria, and Ninety-mile Beach.

Hydraulic Lime, the lithographic limestone, produces a lime, slightly hydraulic. The lime made at Limestone Creek, near Guildford, is also hydraulic; the Collingwood or Fitzroy limestone is highly so, containing 52 per cent. carbonate of lime; 18 per cent. carbonate of magnesia; 12 per cent. alumina, and 18 per cent. hydraulic silica. This limestone is very limited in extent.

Septaria, in the form of white and grey cement stones are obtained at Spring Creek, 15 miles from Geelong. Mr. Selwyn, the late Government Geologist of Victoria, in his Report of July, 1854, refers to a bed of stiff blue clay containing bands and septaria of hard grey argillaceous limestone, "nodules of precisely similar nature are extensively collected for the manufacture of cement from the London clay, the cliffs of Hampshire, the Isle of Sheppey, &c."

Much additional information on the subject may be obtained from the Victorian Government Prize Essay on Economical Manufactures, a copy will be found at the School of Arts, Sydney, and the Public Library, Melbourne: the Geological maps of Victoria afford much practical information.

Shell Lime is made on most parts of the coast, but is only fit for internal plastering; it is about half the price of roche, or stone lime. The shells might be crushed and used with clay, for making cement.

BRICKS.

Bricks, &c.—In consequence of the absence of good freestone in Melbourne, there were large brick works in the suburbs of Melbourne, producing really first-class bricks, twenty-eight years ago, when the plant of any brickfield near Sydney, might have been bought for a few pounds, and a really first-class brick in Sydney was a scarce article, this has resulted in the general prevalence of good specimens of brick architecture in Melbourne, and the almost total absence of superior ornamental brick-buildings in Sydney. Within the last fifteen years this want in Sydney has been greatly modified; but even now, fancy or special bricks in Sydney are at least double the price of similar bricks in Melbourne, where they are constantly kept in stock. Without going into details as to the resources of Victoria in the manufacture of every description of bricks, tiles, pipes, *terra cotta*, &c., as I have done in treating of similar building materials in N. S. Wales, I may state generally that whatever is made in the latter colony in this line, can be produced equally good or better in Victoria where the *absence of good freestone* necessitated early and studious attention to the production of a suitable substitute.

METALS.

Rolled Iron and Lead Piping have been manufactured near Melbourne for the last 25 years, and are fully equal to similar imported articles.

M'Lean's Composite Columns, patented in Melbourne, claim special attention on account of their efficiency, economy and beauty, when compared with the cast iron columns they have almost superseded, for verandahs and balconies; they consist of an outer casing of galvanized sheet iron, with a core in the form of an iron pipe, angle or T iron, the spaces being filled with cement and clean sharp sand as a concrete, the capitals and bases are of cast zinc. They were introduced into Sydney about seven years ago and are much liked and largely used.

All the most useful and valuable Australian timbers abound in Victoria.

From the Australian Engineering and Building News, for August 1879, I extract some information on the tensile strength of some of our best woods, tried with samples 12 inches long, reduced in the centre to one-sixteenth of an inch sectional area, by a length of 2½ inches. The specimens were held at each end by wrought-iron clips, the top clip being suspended from a wooden frame, the lower clips held by a lever, to the long end of which were suspended the weights The wood was well seasoned and above the average quality used for building.

The results of the experiments are given in the Table showing the Strength of Building Materials, (see Index), and were made at Geelong by Mr. J. A. Campbell, C.E., who laid the results before the Royal Society of Victoria, in May, 1879.

The specimens tried were too small to be of much practical use, except as to the relative strength of the specimens, and even then the relative age, seasoning, defects, part of the tree from which the specimen was taken, the straightness of the grain, and length of grain when attenuated or cut down to the sixteenth of an inch in area, would affect the general results. One specimen of Blackwood had one-eighth of an inch area for the greater portion of its length, but was notched in the centre, so as to reduce it to the sixteenth of an inch in area, ; this broke at 32,000 lbs per inch, the highest strain attained by any wood. The straightest-grained specimens were invariably found to be the strongest.

BLUE GUM, *Eucalyptus globulus*.—Leaves scattered and same colour on both sides It is of rapid growth, producing at the same time a most remarkable variety of leaves. The young leaves are of a bluish tinge, from which the tree derives its name; bark near butt dark and rough, on stem light and smooth. It is a favorite tree for Reserves, Parks, &c., and is easily raised from seed. being much cultivated in Ceylon, South Europe, Melbourne, Algiers, America, &c. It thrives in all places and converts fever-stricken swamps, &c., into healthy localities. It is one of the largest known tree. The "Geelong Advertiser" states—"In the Dandenong forest there is a fallen tree 435 feet long, from the root to the topmost branch; the largest tree recorded in California is said to be 325 feet in height." This must be the "*Wellingtonia gigantea*," the largest known pine-tree. Timber—pale straw colour, heavy, strong, and durable: it is much used for ship-building, engineering works, and building, fences, sleepers, &c. It is in the second-class list at Australian Lloyd's, A, for 10 or 12 years. Like most of the Australian hardwoods, it is not sound at heart, and cracks or shakes are produced in seasoning, with the usual shrinkage and warping. It specific gravity is about 1.04 before seasoning and 0·95 after. The experimeets made in Victoria show that the transverse strength increases with the drying or seasoning.

Tensile strength.—From experiments made by Mr. J. Mitchell, on five pieces of blue gum 7 ft. long by 2 ins. square, seasoned from 2 to 5 years, the average tensile strength was found to be equal to 27,369 lbs per square inch. The average crushing weight of one square inch as given by Mr. Laslett is equal to 3 tons

IRONBARK, *Euc. sideropholia*, is a dense, deep red, close-grained wood, and stands high as regards its elasticity and strength, as per Table, page 162. It may be readily recognised in the forest by its blackish, deeply-serrated and ridged bark, which is impregnated with black gum. It is largely used for girders, sleepers, piles, and engineering works generally. It is the heaviest wood in general use, its specific gravity, just felled, being 1·420. Its strength, English oak being 1·00, is 1·55.

Eucalyptus Leucoxylon, is another kind of Ironbark, leaves narrow, foliage scanty, bark hard, deeply furrowed, and dark, but sometimes pale and smooth It is generally found on the goldfields or upon auriferous ground.

Euc. creba, known in Queensland as the white, narrow-leaved Ironbark. These three varieties of Ironbark possess similar properties. Logs can be obtained 50 feet x 18 inches sq.; the colour from a dark red to a light yellow; the grain is straight, close, and rather greasy. For ship-building it is classed first at Lloyds'.

BLACKWOOD is a superior timber for joinery or carriages. It is little liable to warp or crack; is often used for carved and cabinet work, and resembles walnut in grain and colour. It is well adapted for eccentric turning, being free from pores and hard, although not destructive to tools. It receives a brilliant polish, is almost free from pyroligneous acid, and is on that account considered the best wood for the handles of surgical instruments. Diam. 18 to 36 ins. and height from 40 to 100 feet. Spec. gravity .620, when seasoned.

STRINGY BARK, *Eucalyptus Macrorrhyncha*, grows to a great height and size in Victoria and Tasmania, 200 ft. to the first limb being of common occurrence. It is largely used for market scantlings of building timber, and is one of the earliest and best known timbers. It readily splits into posts and rails, palings and shingles, and is generally found on the goldfields, where it is also used for slabs for lining shafts, &c. Although occasionally used for girders or beams, it is inferior for this purpose to either blue gum or box. It has been exported from Tasmania to Victoria in large quantities, and in well-known scantlings, which have become general in Victoria, N. S. Wales and Queensland, for this and all other marketable hardwoods. Its specific gravity is 1.020 or 63¾ lbs. per cubic foot. The leaves are of a dull green, foliage thin, the bark dark, deeply ridged thick and stringy, and is much used in the bush for roofing huts and sheds, covering partitions, &c. The wood is hard and varies from a straw colour to a light brown. Like most of the marketable hardwood it shrinks at least 4 per cent. of its thickness or depth and is frequently marred by large gum veins; it is readily attacked by

white ants, especially if unseasoned. The strength of any scantling may be readily obtained by referring to the Table in this Book, pages 165 and 166.

MESSMATE, *Euc. obliqua.*—This is one of the nine varieties of stringy bark and has much the same properties; it was formerly much used for bridges by the Roads and Rivers Department of Victoria; it abounds in the Bullarook forest, near Ballarat, in great perfection, and is generally found associated with ordinary stringy bark; its tensile strength is given by Campbell as less than one-half that of stringy bark, or about the same as red deal; but this exception to all other hardwoods requires confirmation. The wood from which this test sample was obtained, is stated to have been "well seasoned, clean, but not quite free from shakes." It attains the height of 300 feet.

PEPPERMINT GUM, *Euc. amygdalina* or the almond leaved gum, another of the nine species of Stringy Bark; this and the blue gum are the largest trees in the world, the celebrated *Wellingtonia sequoia* of California, not excepted. The Rev. Robert Collie, F.L.S., in his lecture on the Forest Trees of New South Wales, stated that in the deep gullies of the Dandenong Ranges a tree was measured 480 feet in height, and some of these trees are reported to be 53 feet in circumference or 17 feet in diameter. It is used for ship, bridge, and house building, shingles, fences, &c. The leaves yield the largest quantity of volatile oil, 500 oz. having been extracted from 1000 lbs. of leaves, this oil is used in the manufacture of varnish and scents.

RED GUM, *Eucalyptus Rostrata.*—Bark smooth and whitish; diam. up to 14 feet, and height up to 250 feet. Generally found on river banks and swamps; it is very abundant on both banks of the Rivers Murray and Murrumbidgee. It is a valuable timber, having been largely used for railway sleepers, piles, girders, fencing, &c. Of a deep red colour, heavy, hard and close, but short in grain, the trunks generally break in falling; it shrinks but little and is very durable under ground or in water; it is in the first class for shipbuilding at Australian Lloyds', being A for 12 years.

Experiments were made at the Victorian Railway Department in 1875, of great value, the pieces tested being unusually large, and the observations as to deflection, &c., being numerous and carefully noted; the pieces were 14'.8", bearings and scantlings average about 11" x 8"; the weight used ran as high as 15 tons, the deflection varying from ¼ inch for 1 ton to 3¼ inches for 14½ tons. It seems to be a general rule that the larger the specimens tested, the smaller proportionately will be the strength. We find a similar result in the proportionate strength of rod iron and iron wire or wire rope, the imperfections of the larger specimens are hid from view, &c. See Australian Building News, No. 12, Vol 2.

The Descriptive Catalogue of the specimens in the Industrial and Technological Museum, Melbourne, published in 1885, contains much valuable information on this subject.

SPOTTED GUM, *Euc. Goniscalyx.*—Foliage thin and of a dull green colour, stamens all fertile, height up to 300 feet, diam. of trunk up to 8 feet. It is also known as the Bastard box and Mountain Ash. The timber varies from pale yellow to brown, is hard, durable, free from veins and little liable to warp. It is much used for sleepers, piles and general building purposes. Its specific gravity is ·981. See Index as to strength, &c. It is well-known in N. S. Wales and was largely used in the construction of the late Internat. Exhibition in Sydney.

YELLOW BOX (*Euc. Mellisdora*).—Leaves scattered and of a dull green colour; the bark on trunk is brown outside, but of a bright yellow inside next trunk; the trunk when stripped being also bright yellow; height up to 250 feet, diam. up to 8 feet. The timber is tough, dense and durable and superior even to Ironbark in actual strength. See Index and the Tables I have cast out from the Tabulated formulæ.

KARI, *Euc. diversicolor.*—Leaves scanty and paler on the underside, stamens all fertile, bark smooth and white, it is found on the coast range; height up to 400 feet, diam. of trunk up to 20 feet, vying with the Blue gum or king of forest trees, not only in size but also in hardiness and quickness of growth; the timber is light red, hard, dense and tough, and is used for the same purposes as Blue gum. Spec. gravity ·980. Tensile strength 7070 lbs. per square inch. Crushing weight per sq. inch lengthwise 12,513 lbs. according to Leslett the only authority on this subject. This timber is not so well-known as the other Eucalyptii of commerce.

BLACKBUTT, *Euc. pilularis*—Leaves scattered and paler on underside; stamens all fertile; branches angular. The bark is rough, blackish and persistent or firm on butt, but smooth and whitish on upper part of trunk; it is found on the coast range; height up to 300 feet, and diam. up to 14 feet near the butt; the timber is hard and strong and is used for building scantlings, bridges, sleepers, &c. Spec. gravity, ·990; crushing weight per sq. inch lengthwise, 8449 lbs., and transverse, 8064 lbs. See Index for N. S. Wales Timber.

WOOLYBUTT, *Euc. longifolia*—Leaves long and dull green; flower-stalks long and slender; stamens (of flowers) all fertile; seed vessels large; bark persistent (or fixed) rough and grey; height up to 150 feet. It is found on the coast side of Dividing Range; timber durable and strong; used for sleepers, drays, fences, &c. Spec. gravity, 1·034; crushing weight, lengthwise, 7997; transverse, 2968 lbs. per sq. inch.

BLOODWOOD, *Euc. Corymbosa*—Leaves scattered and pale on underside, the side veins being nearly square to mid vein; stamens (of flowers) all fertile; seed lobes large; bark persistent, rough and grey; height up to 150 feet; timber hard, durable and veiny. It is used for bridges, fencing, sleepers, &c. Sp. gr. ·918.

Forests of dead trees, presenting a most sterile and ghastly appearance, are now to be seen in Victoria and N. S. Wales,—the effect of ring-barking. This is reported to be especially so from Spring Creek to Mount Rouse; also near Hawksdale and Hamilton down to Eumarella, in county of Villiers and Normanby.

BUILDING MATERIALS OF NEW ZEALAND.

Abridged from the New Zealand Handbook, &c.

BASALT, *or Bluestone* is found in many parts of New Zealand, and is very abundant in the North Island; it is largely used for road metal, rubble-masonry, and where durability is the primary consideration, and the stone is homogeneous and free from honeycomb, for square or dressed masonry. The cost of working this stone is about the same as for the Melbourne bluestone.

Bluestone basecourse and curbing, from Port Chalmers, was exhibited at the Sydney International Exhibition in 1879.

PORPHYRY is found at Flagstaff Hill, Malvern Hills, &c., specimens were exhibited at the Sydney and Melbourne Exhibitions.

TRACHYTE, a fine grey stone, occurs at Port Chalmers, also a *breccia* of this stone, used in the construction of the dock there, and for the street curbing of Dunedin.

CLINKSTONE—The gaol and other old buildings, and the foundations of modern buildings in Dunedin are built of this stone, obtained from Blanket Bay. It is of a mottled grey, very hard and compact.

GRANITE.--Coarse-grained pinkish, with grey spots, is found in masses at Preservation and Chalky Inlets on the west coast of the South Island. At Stewart Island and the West Coast is found beautiful fine-grained granite, suitable for monuments, columns, &c. On the south-west coast the granites could be easily quarried and shipped, more especially on the west shore of Blind Bay.

MARBLE, close-grained, is obtained from Aniseed Valley, Nelson; white and dove-coloured marble is obtained from Caswell Sound of a superior quality; it took the first prize among the marbles exhibited at the Sydney Exhibition; it can be procured of any size, and fine samples were sent to Dunedin, Melbourne, Sydney, and London, the proprietors believing it is only to be known to be generally appreciated. Red and grey marble from Canterbury was exhibited at the Sydney International Exhibition.

LIMESTONE of all kinds is found in New Zealand, chiefly of a blue colour, without fossils, in large masses, in the coal-fields. An immense mass occurs in the Kakanui Ranges of Otago; also large varieties fit for building stone are found on the Malvern Hills, Canterbury, and Hokanui Hills, Southland.

At Wairo, Auckland (in the North Island), is found a good, hard, fine-grained, buff-coloured stone, fit for building or lime. My personal knowledge of the building materials of New Zealand is derived chiefly from the specimens exhibited at the Sydney International Exhibition, so ably supported by the excellent and copious Handbook, prepared by Dr. Hector, F.G.S., &c., whose descriptions and locality of the earthy limestones, sandstone, &c., I give at length.

Freestone.—A fine limestone of a brown tint occurs near Dunedin, at Boat Harbour; it works freely, seems durable, and is said to exist in large quantities, and to be procurable in moderate-sized blocks; it has the disadvantage of not being in an easily accessible situation.

A hard, shelly, and white limestone occurs at Kakanui, and is used in some structures in that locality; it is of a uniform colour and consistency and easily worked, and procurable in large blocks. The supply is unlimited.

Southland possesses a fair stone of this kind.

A valuable limestone occurs on the Otago Peninsula, near Port Chalmers, in two beds, one dark coloured and the other yellow, the last contains a rather large amount of fine-grained sand, yellow and black; they burn to pretty good quick lime.

A good stone for lime occurs in the Isle of Scinde, Napier; it is fossiliferous and of upper tertiary age.

At Oamaru a limestone is largely burnt for lime by Mr. D. Hutchinson; it is found in dislocated and concretionary masses, intermixed with quantities of worthless rock, which greatly increases the expense of extraction. It is fossiliferous.

A hard, very compact, grey-coloured stone of considerable purity occurs near the Moke Creek copper lodes, and affords the flux required for reducing the ore. It is fossiliferous and of lower tertiary date.

Freestone, various colours, from Fews Creek. This freestone is said to be imperishable, can be obtained of any size and put on board lake steamer at 2s. 6d. per cube foot; freight to Kingston railway station 10s. per ton.

Sandstones.—*Siliceous or pure Sandstones*, associated with the coal measures of New Zealand are found in Otago, Canterbury, and Auckland. Mungaioa in the North Island produces a good sandstone of this class; also the Waikato district and the mountain range between Hawke Bay and East Cape.

Calcareous Sandstones are confined to the upper tertiary formation of the South Island, Dunedin, and Oamaru; the province of Wellington and Hawke Bay, in the North Island, also yields this useful building stone. Argillaceous sandstones are found at Saddleback, Moeraki, Mount Pleasant, and at Anderson's Bay, Otago.

Cement *boulders*, from the sea beach, Port Moeraki, Otago, were exhibited at the Sydney International Exhibition in 1879.

Natural cement stones or septaria occur in the lower part of the Marine tertiary series, and in some cases are quite equal in quality to those which are burnt for the manufacture of hydraulic cement in Europe. The cement hitherto so largely used in New Zealand has been imported, but with the great resources the colony possesses in the raw material for the manufacture, this will probably not be long continued.

In the following Tables, Nos. 1 and 3 are analyses of the whole nodule, while Nos. 2 and 4 are without the calcareous veins. Those from Moeraki are very hard and compact, colour mottled grey, specific gravity 2·655. Those from Amuri are similar in character. Septaria used in England and France for manufacture into Roman cement are added for the sake of comparison.

Obtained at	Moeraki.		Amuri.		Sheppey.	Boulogne
	1	2	3	4		
Carb. of Lime	72·4	50·8	68·6	54·9	69.0	63·9
Carb. of Magnesia ...	·3	—	1·7	1·5	—	—
Alumina& Iron Oxides	8·7	7·6	6·5	6·4	10.5	12·3
Soluble Silica	·8	—	1·0	1·0	18·0	15·0
Sand and Clay	17·8	41·6	31·2	31·9		
Water...	·6	—	1·1	1·2	1.3	·6

Materials for Portland Cement.—The manufacture of Portland cement might be made an important industry in New Zealand excellent lime and non-ferruginous clay being obtainable.

SLATES in slabs, and Countess roofing slates were exhibited from Otepopo, Otago.

FLAGGING, *artificial Caithness*, 33 feet by 12 feet, laid at the main entrance to the Sydney International Exhibition, was exhibited by C. O'Neil, C.E., the patentee, and was really a first-rate article, having withstood the immense traffic of the exhibition for twelve months at least, with little deterioration or wear. It is far superior to the Sydney freestone as flagging.

BRICKS.—The materials for brickmaking are plentiful throughout the colony. The clays are admirably adapted for the manufacture of the best kinds, and when it is properly weathered and tempered by mixing the clay into a perfectly homogeneous mass, and thoroughly burnt, would equal any of British manufacture.

POTTERY.—The success of the pottery works that have been established at Tokomairiro, also at Christchurch and other places, has proved the adaptability of the fire and pottery clays of the colony for the best kinds of fire bricks, drain pipes, chimney pots, tiles and all kinds of pottery, porcelain, and terra cotta goods.

Fire Clay and Fire Bricks made from same are obtained at Christchurch, Brunnerton, and Grey River: the clay and bricks are shipped at £2 per ton, and £6 per 1000.

Fire Clay, Bricks, Tiles and Puzzalano, from Newton, Auckland.

Drain Pipes, and Stoneware from Christchurch.

Gypsum, Limestone, and Marble from the head of Lake Wakatipu.

OAMARU FREE LIMESTONE.—This excellent stone was thus referred to (Dec. 1877) by W. Blair, Chief Engineer of Public Works at Otago:—The Oamaru Stone is a white granular limestone. According to the Government Analyst, its chemical constituents are as follows:—Carbonate of lime, 99·15; Alumina, 1·55; Oxide of iron, ·55; Soluble silica, ·45; Insoluble matter, 7·15; Loss, ·15; 100·00. this places it in the same class as the *Oolites of England and Caen stone of France.* It has a remarkable uniformity of colour and texture, and can be obtained in large blocks. Like all limestones of this kind, it is quite soft when quarried, but hardens rapidly on exposure to a dry atmosphere. This enables it to be worked into the most elaborate ornamentation at little cost.

The stone is rather porous for use in a damp situation, but it answers well in ordinary walls and columns in a moderately dry climate, and it is unexcelled for internal decorations.

The durability of the Oamaru stone has not yet been thoroughly tested, its resistance to the disintegrating action of sulphate of soda is comparatively feeble. This really valuable stone was largely exhibited at the Sydney and Melbourne Exhibitions, and has been already extensively used in Melbourne. It obtained a first-class medal at the Sydney and Victorian Exhibitions. The Bank of Australasia and Imperial Insurance Offices, in Melbourne, are built with this stone.

BUILDING TIMBER. *Abridged from the New Zealand Handbook.*

KAURI, *Dammara Australis* (Lambert).—The kauri is the finest forest tree in New Zealand, and attains a height of 120 to 160 feet. The trunk is sometimes 80 to 100 feet high before branching, and attains a diameter at the base of 10 to 20 feet.

The timber is in high repute for masts and spars, deck and other planking of vessels, and is largely used for flooring and joinery. There is abundant evidence of its durability for more than 50 years in some of the old mission buildings at the Bay of Islands. On the Thames goldfields it is used for mine props, struts and cap pieces. *It forms the bulk of the timber exported from New Zealand.*

The variety known as mottled kauri is largely used for panelling.

Kauri pine is stronger as a beam than any other known pine, but unlike them it shrinks lengthwise.

The kauri pine occurs only in the North Island, and north of Mercury Bay, and grows best near the sea, on wet clay land.

The turpentine of this tree forms the celebrated kauri gum, which is extensively excavated from the sites of old forests as far south as Taranaki. In 1877, 3632 tons, valued at £118,348 was exported.

KAWAKA CYPRESS, CEDAR *Libocedrus Doniana* (Endl.).—This noble tree attains a height of 60 to 100 feet, and 3 to 5 feet diameter. Wood reddish, fine grained and heavy, used by the Maoris for carving, and said to be excellent for planks and spars; grows in the North Island, being abundant in the forests near the Bay of Islands and north of Auckland.

PAHAUTEA CEDAR *Libocedrus Bidwillii* (Hook.)—A handsome conical tree 60 to 80 feet high, 2 to 3 feet diameter. In Otago it produces a dark red free-working timber, rather brittle, chiefly adapted for inside work. Found on the central ranges of the North Island, and common throughout the forests of the South Island, growing at altitudes of from 500 to 4,000 feet. This timber has been used for sleepers on the Otago railways of late years, is largely employed in that district for fencing purposes, and is frequently mistaken for totara. In former years it was believed to be suitable only for inside work.

TOTARA. *Podocarpus totara* (A. Cunn.)—A lofty and spreading tree 60 to 120 feet high, 4 to 10 feet diam. Wood very durable and clean-grained, in appearance like cedar, and works with equal freedom; it is adapted for all kinds of carpenters' work. It is used extensively in Wellington for house building and piles for marine wharves, bridges, railway sleepers, &c.; it is one of the most valuable timbers known, The wood, when felled during the growing season, resists for a long time the attacks of the teredo worms; it splits freely and is good for palings and shingles. Totara post and rail fences are expected to last 40 to 50 years. It grows throughout the North and Middle Islands upon both flat and hilly ground; the latter as usual being the best.

MATAI or MAI, *Black pine of Otago Podocarpus spicata* (Br.)—A large tree 80 feet high, trunk 2 to 4 feet diam., wood yellowish, close grained and durable; used for piles, bridges, wharves, jetties, bed plates for machinery, millwrights' work, flooring, house blocks, railway sleepers, and fencing. Bridges in various parts of the colony afford proof of its durability. Grows in both North and South Islands at altitudes under 1,500 feet.

KIHIKATEA, *White pine, Podocarpus dacrydoides* (A. Rich.)—A very fine tree 100 to 150 feet high, 4 feet diam., timber white and tough, soft, and well adapted for indoor work, but will not bear exposure, it is abundant throughout the Northern and Middle Islands; when grown on dry soil it is good for the planks of small boats, but from swamps it is almost useless. A variety of this tree, known as yellow pine, is largely used in Nelson, and considered to be a durable building timber.

RIMU, RED PINE, *Dacrydium cupressinum* (Soland.)—Tree, pyrimidal with weeping branches, trunk 80 feet to 130 feet high, and 2 to 6 feet diam., wood red, ornamental and useful, clear grained, heavy, and solid, much used for joisting, planking, and general building purposes from Wellington southward. It is *liable to decay when wet*, is largely used in the manufacture of furniture the old wood being handsomely marked like rosewood, but of a lighter hue. It grows throughout the Northern, but is of better quality in the Southern Islands.

MONOAO, *Yellow pine, Dacrydium colonsoi* (Hook).—A very ornamental tree from 20 to 80 feet high. Wood light and yellow. *It is the most durable and strongest timber in New Zealand.* Posts of this wood have been in use among the Maoris for several hundred years. Grows in Northern and Southern Islands up to 4,000 feet altitudes, and is curious for having two kinds of leaves on the same branches. It is greatly valued for furniture.

TANEKAHA, CELERY-LEAVED PINE, *Phyllocladus trichomanoides* (Don.)—A slender handsome tree, 60 feet high, trunk rarely exceeds 3 feet diam.; wood pale, close-grained, and excellent for planks and spars; *resists decay in moist positions in a remarkable manner*, and grows in the North Island, especially in the hilly districts.

TOWAI, RED BIRCH, *Fagus Menziesii.* (from the colour of the bark.) A handsome tree, 80 to 100 feet high, trunk 2 to 3 feet diam. The timber is chiefly used in the lake district of the South Island, it is durable, adapted for masts, oars, cabinet and coopers' work. Grows in the North Island on the mountain tops, but is abundant in the South Island at all altitudes below 3,000 feet.

TAWHAI, or TAWHAI-RAIE-NUI, *Fagus fusca* (Hook).—Black birch of Auckland and Otago (from colour of bark). Red birch of Wellington and Nelson (from colour of timber). This is a noble tree from 60 to 90 feet high, the trunk 5 to 8 feet diam., the timber is excessively tough and hard to cut. It is highly valued in Nelson and Wellington, being both strong and durable in all situations. It is found from Kaitaia in the North Island to Otago in the South Island, but often locally absent from extensive districts, and grows at all heights up to 3,000 feet altitude.

WHITE BIRCH, *Fagus solandri* (Hook) of Nelson and Otago (from colour of bark). Black-heart birch of Wellington. A lofty, beautiful evergreen tree 100 feet high, trunk 4 to 5 feet diam., the wood is well adapted for fencing and bridge piles, and the bark is useful as a tanning material. It grows only in the southern part of the North Island, but is abundant in the South Island in localities of from 3000 to 5000 feet in altitude

MANUKA, *Leptospermum ericoides* (A Rich)—A small tree highly ornamental, trunk from 28 to 30 feet long, and 10 to 14 inches diam., the wood is hard and dark coloured, largely used for fencing, axe handles and sheaves of blocks. It is highly valued in Otago for *jetty and wharf piles, as it resists the marine worm better than any other timber found in the province. It is also extensively used for house piles.* The lightest coloured wood, called "white manuka," is considered the toughest.

RATA, *Metrosideros robusta* (A. Cunn.)—A tall erect tree 50 to 60 feet high, and 4 feet diam., but the descending roots often form a hollow stem 12 feet in diam. It is used for ship-building. On the tramways of the Thames it was used for sleepers, which were perfectly sound after five years' use, it grows in the North Island; and is usually found in hilly situations from Cape Colville southwards.

POHUTUKAWA, *Metrosideros tomentosa* (A. Cunn.)—This tree has numerous massive arms; its height is 30 to 60 feet; trunk 2 to 4 feet diam., the timber is specially adapted for the purposes of the shipbuilder, and has usually formed the framework of the numerous vessels built in the northern provinces. Grows on rocky coasts, and is almost confined to the province of Auckland.

PUKETEA, BROADLEAF, *Griselinia littoralis* (Raoul.)—An erect and thickly branched bush tree, 50 to 60 feet high; trunk, 3 to 10 feet diam., the wood splits freely, and is valuable for *fencing and shipbuilding*, some portions make handsome veneers. Grows chiefly in the South Island and near the coasts.

KOHE-KOHE, *Dysoxylum spectabile* (Hook.)—A large forest tree 40-50 feet high. Wood tough, but splits freely, and is considered durable for piles under sea water. Grows in the North Island.

MAIBE-TAW-HAKE, *Eugenia maire* (A. Cunn.) A small tree about 40 feet high; trunk 1 to 2 feet diam., the timber compact, heavy and durable, and is used for mooring-posts and jetty-piles on the Waikato, where it has stood well for seven years It is highly valued for fencing. Common in swampy land in North Island.

PURIRI, *Vitex littoralis*.—From 50 to 60 feet high, trunk up to 6 feet diam., the wood is hard and of a dark olive brown, much used and said to be indestructible. Grows in the north of the North Island only.

REWAREWA, *Knightia excelsa* (Br.)—A lofty slender tree 100 feet high. The wood is handsome, mottled red and brown, used for *furniture, veneers, shingles, and fencing, as it splits easily*. Common in the forests of the Northern Island, growing on the hills in rich and poor soils.

RIMAN.—A small tree, about 50 feet high, and 18 inches diam. with brown bark, the wood is yellowish brown and close grained, very *durable for fencing and piles*. Common throughout the islands.

KOWAI, *Sophora tetraptera* (Aiton)—A small or middling-sized tree. It has a splendid appearance, with large pendulous yellow flowers. The wood is red; *being highly durable*; it is used for piles in bridges, wharves, and fencing, etc. Abundant throughout the islands.

BLACK MAIRE, *Olia Cunninghamii* (Hook., fil.—40 to 50 feet high, 3 to 4 feet diameter; timber close grained, heavy, and *very durable*.

Waste.—Much of this very valuable timber is at present destroyed in clearing the land. The woodlands of New Zealand are said to be 20 per cent. of the whole area, but the destruction is so rapid that it is calculated to last only to 1892.

For further information on the Building Materials of New Zealand see the excellent and exhaustive work on the "Building Materials of Otago," by W. Blair, C.E., of Dunedin.

Manufactured mantle shelves, hall and other doors, marquetry flooring (laid at 8s. 6d. per sup. yard), furniture, &c., made from the above timbers were exhibited in the Sydney and Melbourne International Exhibitions, and elicited great admiration.

TASMANIAN BUILDING MATERIALS.

As exhibited in the International Exhibitions, &c

SLATE.—Roofing slates are obtained from Back Creek and Piper River, but are not good enough for common use.

FREESTONE (Sandstone), near Hobart. Good specimens from Tea-Tree Quarry, 21 miles from Hobart; also from Lindisfern; all being similar to the Point Ventenet and Spring Bay sandstone, used in Melbourne for years; the trophy of freestone from Knocklofty was of a brown tinge. These exhibits received a first-class award; there were also specimens from Mona Vale of similar freestone. The Spring Bay sandstone also received a first-class award at the Victorian International Exhibition.

GRANITE from the north-east coast of Tasmania.

LIMESTONE and MARBLE from near Beaconsfield and the River Tamar; also from near New Norfolk.

A large portion of the lime made near Hobart and the Don River is more or less hydraulic, and is therefore well adapted for concrete and for mortar in all exposed situations. It was much used in Melbourne about 30 years ago. As it is liable to fire when slacking, it cannot be exported as quick or fresh lime, but it would probably answer to export the limestone to Sydney, where coals are cheap, and burn it there.

PORTLAND CEMENT.

It seems likely that Tasmania will outstrip the other Australian colonies in the manufacture of a very superior Portland Cement. The official report of the Government Architect last April says:—"I had three *briquettes* made; two were left in water for one week (after one day's setting), and broke respectively at 544 lbs. and 555 lbs on the square inch; the other was made one month before testing and laid in water for two weeks, and withstood a strain of 867 lbs. per square inch." The tensile strength of pure cement required by the Government of New South Wales is 400 lbs. per square inch.

Messrs. W. Penn Smith & Co., of Hobart, are about floating a Company to manufacture this cement. The outlay for machinery to make 6000 tons annually is estimated at less than £5000, which they expect to clear the first year. The hydraulic limestone and clay required in the manufacture are contiguous, on the Rosendale Estate at Bridgewater, near Hobart, easily accessible by railway and water, and as the locality abounds with abundance of excellent firewood for burning the raw materials into cement, the Company, if properly managed, should be a prosperous one. The abundance of the raw materials is vouched for by T. Stephens, Esq., M.A., F.G.S.

FIRE-CLAY, FIRE-BRICKS, &c. can be obtained from the coal measures of Tasmania, as at Seymour, &c.

BRICKS, *Paving Tiles, and Terra Cotta* can also be obtained from the pottery clays of the coal measures and the silurian clays of the goldfields.

WHITE GUM, (*Eucalypta resinifera*), a straw-coloured wood, used in Tasmania for scaffolding, &c. Max. height, 150 feet ; diam. 7 feet. Specimen four years old.

STRINGY BARK, sawn from a split slab, over ten years in use, sound and hard. This is one of the largest trees of Tasmania ; maximum height, 300 feet, and diam., at 4 feet from ground, at least 20 feet. It is of a reddish yellow and is in general use for building.

BLACKWOOD, one of the finest Cabinet woods in Tasmania, also used for wheels, casks, carriages, and railway trucks ; colour of a light walnut ; max. height, 130 feet, and diam. 4 to 6 feet.

MYRTLE, *or Tasmanian Beech.*—Colour yellowish pink, highly ornamental cabinet wood ; max. height, 200 feet, and diam. 12 feet. It is used for flooring boards, carpentry and shipbuilding and is said to resist the *cobra.*

CELERY TOP PINE grows as large as the Myrtle. It is straight-grained, and makes good flooring boards as it does not shrink much.

RED OR PENCIL PINE, from near the source of the River Forth. It is abundant but almost inaccessible.

HUON PINE, like bird's-eye maple, used for panels of doors, &c., and for cabinet work.

SILVER WATTLE found on mountain slopes, height up to 100 feet and 3 feet diam. It is used for staves of casks, &c.

SASSAFRAS.—Bright yellow and used for panels.

HE OAK, or Swamp Oak.—Coarse-grained, light and tough, and beautifully marked.

SHE OAK, or *River Oak*, found on the banks of rivers, &c., it is strong and tough, and used for staves of casks, shingles, &c.

PEPPERMINT (*Eucalyptus amygdalina*).—This is a superior wood for piles, and is said to resist the attacks of the cobra. This and the Blue Gum are the largest trees in the world.

IRONBARK.—One of the best, strongest, and heaviest timbers ; it is used largely for girders, story posts, sleepers, shipbuilding, &c.

BLUE GUM, *Eucalyptus globulus*, so named by Labillardiere, who discovered it in Tasmania, in 1792 ; although found in N. S. Wales and Victoria, it is commonly known as the blue gum tree of Tasmania. It is one of the largest trees in the world, having been known to attain a diam. of 30 feet, while other trees are mentioned 400 feet high, from actual measurement. It grows so fast that in ten years it attains the size of an English oak 100 years old. It is a beautiful tree, and is a great favorite in the Government reserves ; the leaves when young are of a bluish green and nearly round ; they afterwards become long and narrow, of a sea-green colour and very fragrant, producing small white fragrant flowers. The wood when mature is hard, dense, and durable, and is used for ship-building, wharves, jetties, quays, and for general building purposes, sleepers, &c. See Index for Blue Gum.

Eucalyptus piperita, another description of blue gum largely used for shipbuilding.

RED GUM or MAHOGANY, *Eucalyptus resinifera*, used for ships railways and other engineering works and turnery. Diam. 30 inches, and height 70 feet. See Index for Red or Flooded Gum.

SOUTH AUSTRALIAN BUILDING MATERIALS.

As exhibited at the Sydney late International Exhibition, &c.

MARBLE from Rapid Bay, &c., awarded first-class medal; also three marble mantelpieces, valued at £10, £15, and £25, of South Australian marbles.

Kapunda Marble, now being used for the new Parliament Houses, is obtainable at Adelaide at the following prices per sup. foot:—sawn marble slabs, 1 inch at 1s. 4d., 1½ inch at 1s. 11d., 2 inch at 2s. 4d., 4 inch at 4s. Rough scappled blocks for building at 3s. 6d. per cube foot. For the sake of comparison I give the price of Italian marble polished and rounded on edges per sup. foot ¾ inch, 7s. and 1½ inch 9s. The polishing &c., costs about 2s. per sup. foot.

White Marble, from Macclesfield, Angaston, &c., was imported into Melbourne in 1857, and formed part of the structure called the Building Museum. The great cost of working this and other marbles would preclude them coming into general use, except for cemeteries, monuments, mantels, slabs, &c.

LIMESTONE (*Tertiary*) is largely distributed over the colony, in the form of a freestone, very much like the Oamaru freestone of New Zealand. Specimens were exhibited from North Adelaide, &c.

Para Wurlie Limestone is extensively found on the southern sea coast; *it is of a salmon tint*, and was dressed as a building stone in the Exhibition. Like the Oamaru freestone it is soft and is easily cut with a knife.

Manoora, Tea-tree Gully, &c., yield abundance of freestone. Excellent blocks of even quality can be procured up to ten tons weight at about 2s. per cu. foot, delivered in Adelaide. This stone has been used far the University in party colours, white and buff. Its weight is about 138 lbs. per cube foot or 16¼ ft. per ton. Oamara stone is similar in quality, and can be obtained at Adelaide at about 2s. 9d. per cube foot

Freestone.—This is another name given to those portions of the above limestones that are suitable for building, the waste stone being used for lime which is sold in Adelaide at 1s. per bushel. There are extensive quarries south-east of the colony, at the Hanging Rocks, Mount Gambier district, &c. Mr. Pitman, of Adelaide, says there are strata covering hundreds of square miles, in places 90 feet thick; it has been well tested for 21 years at Port MacDonnell, and similar stone has been used for the Post-offices and other buildings at Adelaide, &c. It was shown as 9-inch dressed cubes in the Sydney International Exhibition, and can be cleared from the port at 2s. 9d. per cubic foot. At the Gawler Plains it is found in nodules, and in this form is only fit for lime. There can be little doubt as to its identity with the Oamaru stone, which for the last seven years has been the favourite freestone for public buildings in Melbourne. It extends from the Gawler Plains to Mount Gambier, where it has been used in the construction of the Mount Gambier Hospital, in conjunction with a salmon-tinted dolomite, or magnesian limestone,

which costs about three times as much to work as the freestone, and was therefore used as rubble (or hammer-dressed stone), to reduce the cost of construction ; the building complete cost £14,000.

Dolomite, or magnesian limestone (just referred to) is a first-class building stone, and is found associated with the South Australian freestone, but the great cost of working it with edged tools will prevent its being much used except as rubble. If dolomite contains over 5 per cent. of alumina, it makes an excellent hydraulic lime ; the Collingwood (near Melbourne) dolomite contains 11 per cent. of alumina. See p. 178 It would be interesting to know the analysis of the South Australian dolomite for hydraulic lime. If used as a building stone it could be delivered on board for exportation at 3s. 9d. per cubic foot.

GRANITE procured from Port Elliot or Victor Harbour is of excellent quality, but is little used on account of the great cost of working it.

Blocks 12 ins. x 12 ins. splayed and dressed cost 12s. each, and in larger blocks rough scappled cost 4s. per cube foot.

SLATE—Good roofing slates are obtained at the Willunga quarries, and samples were exhibited at the Sydney Int. Exhibition of Duchess and Countess slates, the prices—delivered at Port Adelaide and Sydney for Countess slates were £9 and for Duchess £12 per 1000.

Slate slabs of a good durable quality are found at Mintaro and delivered at the Mintaro railway station at prices varying from 5½d. for ¾-inch slate, to 1s. 6d. for 3-inch slabs, self-faced or in the rough. This Slate obtained a first-class award at the Sydney International Exhibition. The prices for slabs delivered in Adelaide per super foot, one inch, at 10d., 1½ in. at 1s. 2d. ; 2 in. 1s. 5d., 3 in. 2s.

Clay slate building stones from Glen Osmond quarries, are largely used as rubble for buildings in Adelaide, and are considered of the first quality. Price per cu. yard delivered in Adelaide is 4s. 6d. It has lately been used for the Jubilee Exhibition.

BRICKS, best compressed machine made, are produced at Blackwood Bowden, &c., and delivered in Adelaide at 50s. per 1000 and common hand-made bricks at 38s. per 1000.

GYPSUM in nodules and crystals is found in Yorketown and burnt into Plaster of Paris.

TIMBER—The best forest trees of South Australia are similar to those already treated of, viz. :—

RED GUM (*Euc. rostrata*) ; Blackwood (*Euc. melanoxylon*); Stringy Bark (*Euc. obliqua*); White Gum (*Euc. siderophlia*); Blue Gum (*Euc. veminalis*) ; and others of less note, such as Mallee, She-Oak, Black Oak, Sandal-wood, Mulga, &c.

PEPPERMINT (*Euc. odorata*) is similar and about equal in strength to stringy bark ; when fresh split it shows variegated streaks of light yellow and pink. It is used for bridges and building scantlings.

White Ants and *South Australian Timber*—The Forest Board of South Australia caused blocks of the following timbers to be buried in a white ant heap for about fifteen months, with the following results :—

1 and 2. That the red gum and sugar gum, if cut while the sap is flowing, are very much interfered with, but if well seasoned, are not so liable to attacks of the white ants.

3. That the Ironbark (*Euc. leucoxylan*) resists white ants when seasoned.

4. That (*Euc. odorata*) is the least affected of any of the woods experimented with.

5. That the dry (or seasoned) timber of all the kinds named resists white ants better than when fresh cut. See article in *Australian Engineering and Building News*, Jan. 1, 1880.

QUEENSLAND BUILDING MATERIALS.

Exhibited in the Sydney and Melbourne Exhibitions.

Marbles or limestones hard enough to polish.

Ravenswood..—Statuary marble.

Broken River.—Tropical Queensland. Black fossil marble, also basalt or bluestone.

Gladstone variegated marble (marble font).

Calliope River, rose, black, white, yellow and other marbles.

Rockhampton, variegated marbles from quarry, Northumberland Group, also from Percy and other Islands on the Queensland Coast.

Warwick, black and white statuary marbles.

Granite—*Gilbert Gold Fields*, red granite.

Ravenswood Gold Fields green granite.

Freestone—*Sandstone and fire-clay* will be found in all the Coal fields of Queensland, the dip is flat and never exceeds 30 degrees.

Ipswich Coal measures.—The coal measures also produce fine brick earth or shales from which the best bricks, tiles and terra cotta are made. The coal measures are also found at Maryborough, Rockhampton, Warwick, West Moreton, and Brisbane,

Flagging and Slate, will generally be found in all Gold fields the dip is rarely less than 50 degrees mostly nearly vertical.

Building Timbers.

The following description of Queensland timbers used for building has been taken chiefly from the Queensland Catalogue of Exhibits at the Sydney International Exhibition. The wholesale local cost prices given are those of 1879, and the present retail prices at Brisbane are more than double the local prices given in page 93.—As there has been little or no change in wages in Queensland since 1879 the present prices must be similar. The timber trade of Queensland is immense. Irrespective of an immense home consumption, which it is impossible to estimate, there is a large export trade in cedar and pine logs—exceeding £60,000 per annum.

RED CEDAR, *Cedrela Toona*,—Diam. 24 to 75 inches; height, 100 to 150 feet. This magnificent deciduous tree is found in scrubs along the coast, occasionally extending inland for a considerable distance. It puts out large branches, the junctions of which, with the stem, furnish those beautifully curled pieces of which the choicest veneers are made. The timber is light, very durable, easily worked, and is largely employed in house joinery and furniture-making; in fact, whenever lightness and durability are required. It is an article of great commercial importance, and is largely exported to the other colonies.

PENCIL CEDAR (*Dysoxylon*),—Diam., 20 to 40 in.; height, 70 to 80 feet. A large-sized tree inhabiting the rich alluvial scrubs upon the banks of the rivers in the district of Moreton Bay and Wide Bay. Timber of a rich colour, used for cabinet-making and window work. when fresh cut the timber has much the smell of a Sweedish turnip. The wholesale local cost price was 6s. 6d. per hundred feet in 1879.

MORETON BAY PINE (*Araucaria*).—Diam., 36 to 60 in.; height, 150 to 200 feet. This majestic tree is, without exception, the most ornamental and useful tree in Queensland. The timber is an article of great commercial importance, and is used extensively in this colony. The wood is strong and durable when kept dry, but soon decays when alternately damp and dry. When procured from the mountains in the interior it is fine-grained, and is susceptible of a high polish. The wholesale *local* price was 7s. per hundred sup. feet in 1879. Some trees yielding as much as 10,000 feet of saleable timber.

KAURI PINE (*Dammara robusta*).—Diam., 36 to 72 in.; height, 80 to 130 feet. This huge tree inhabits the alluvial banks on the rivers near the coast in the Wide Bay district; also in the moist and sheltered valleys on Fraser's Island. It has a smooth-barked trunk, of a lead colour. The wood is fine-grained, free from knots, and easily worked. It is not plentiful, In 1879 the sawyers received 7s. 6d. per hundred sup. feet, some trees yielding as much as 25,000 feet.

CYPRUS PINE (*Frenela Endlicheri*).—Diam. 20 to 40 in.; height 50 to 70 feet. This tree forms vast forests along the coast, growing o barren sandy soils. The timber is an article of great importance; it is durable, fine-grained, fragrant, and capable of a high polish: it is used for piles of wharves and for sheathing punts and boats; it *resists the attacks of the cobra and white ants*, and the root is valued by cabinet-makers for veneering purposes. The market value at the present time is 10s. per hundred sup. feet wholesale.

SWAMP OAK (*Casuarina equisetifolia*).—Diam., 12 to 24 in.; height, 50 to 70 feet. It grows in great abundance near salt-water marshes and inlets. The wood is coarse-grained, beautifully marked, and used for purposes where lightness and toughness are required.

RIVER SHE OAK (*Cas. glauca*).—Diam., 24 to 36 in.; height, 70 to 90 feet. A robust tree of general occurrence on the borders of rivers and creeks. The timber is strong and tough, used for staves, shingles, &c.

LEICHHARDT'S TREE (*Sarcocephalus cordatus*).—Diam., 24 to 30 in.; height, 40 to 60 feet. A handsome, beautiful, moderate-sized tree: found on the alluvial banks of the Don River, Port Darwin, &c., &c. Its wood is soft, close-grained, takes a good polish, and is often used for building and other purposes.

BLACKBUTT (*Eucalyptus pilularis*).—Diam., 48 to 96 in.; height, 60 to 80 feet. A large tree, with dark-coloured, rough, and somewhat furrowed persistent bark; *furnishes excellent timber for house carpentry*; or any purpose where strength and durability are required. Market value, 8s. per hundred feet wholesale.

SPOTTED GUM (*Euc. haemastoma*).—Diam., 24 to 28 in.; height, 60 to 120 feet. A very large tree, with a smooth deciduous bark, leaving a spotted and variegated trunk; considered a first-class timber for shipbuilding, and much used for wheelwrights' work and other purposes. Market value, 8s. per hundred feet wholesale.

PEPPERMINT TREE (*Euc. microcorys*).—Diam., 18 to 36 in.; height, 60 to 80 feet. A tall tree, with a persistent furrowed fibrous bark, growing in the forest near the Brisbane River; timber strong and durable, used by wheelwrights for naves, felloes and spokes.

YELLOW BOX (*Euc. hemipholia*).—Diam., 20 to 40 in.; height, 50 to 60 feet. A moderate-sized tree, producing an excellent timber, famous for its hardness, toughness, and durability. Market value, 8s. per hundred feet, wholesale.

IRONBARK (*Euc. siderophloia*).—Diam., 20 to 40 in.; height, 70 to 100 feet. A tall tree, with a hard, persistent, rough and furred bark. It occupies many ridgy, stony, forest lands in East and West Moreton and Darling Downs districts, has the highest reputation for strength and durability, and is used for large beams in building stores for heavy goods, railway sleepers, and other purposes where great strength is required. Market value, 8s. per hundred feet, wholesale.

SPOTTED GUM (*Euc. maculata*).—Diam., 20 to 36 in.; height, 60 to 80 feet. A lofty tree, with a smooth bark falling off in patches so as to give the trunk a spotted appearance. It is a very valuable timber, highly prized for many purposes on account of its strength and elasticity, used for buggy shafts, cogs of wheels, &c. In bridge-building it is used for tie beams, &c., and is found to have the highest constant strength of any of the Queensland timbers. Market value, in 1879, 8s. per hundred feet, wholesale.

GREY GUM (*Euc. saligna*).—Diam. 24 to 40 in.; height, 60 to 90 feet. A tall tree with a smooth silver-grey shining bark, shedding in thick longitudinal strips. Of frequent occurrence on the forest ridges near the Brisbane River. It is in good repute for rails in

fencing (as it does not readily take fire), and building purposes, being both strong and durable. Market value, 8s. per hundred feet, wholesale price in 1879.

RED MAHOGANY (*Euc. resinifera*)—Diam. 20 to 30 in.; height, 60 to 70 feet. A tall tree, with a rough persistent bark on the trunk, but more or less deciduous on the branches, The timber is much prized for its strength and durability, and is used for piles, as it is said to resist the action of cobra. Market value, 8s. per hundred feet, wholesale price in 1879.

BLOODWOOD (*Euc. corymbosa*).—Diam. 24 to 30 in.; height, 50 to 60 feet. A fair-sized tree, with a persistent furred bark; timber subject to gum veins, but very durable, principally used for posts, does not readily take fire or suffer much from white ants. Market value from 7s. per hundred feet, wholesale in 1879.

BLUE GUM (*Euc. botryoides*).—Diam., 30 to 50 in.; height, 70 to 100 feet. A lofty spreading tree, with a rough furrowed persistent bark. Of frequent occurrence both upon the coast and in the interior; a valuable timber, hard, tough, and durable. It is the only timber used in Queensland for felloes of wheels, and is one of the finest timbers for ship-building. Market value, 9s. per hundred feet, wholesale in 1879.

RED GUM (*Euc. terreticornis*)—Diam., 18 to 36 in.; height, 60 to 90 feet. Used in fencing, building, plough-beams, poles and shafts of drays, and also in ship-building. Market value, from 8s. per hundred feet, wholesale.

TURPENTINE-TREE (*Euc. Stuartiana*)—Diam, 24 to 40 in.; height 60 to 90 feet. The bark of the branches is smooth and deciduous, that of the trunk rough, rigid somewhat stringy, and hard, it is of common occurrence, exceedingly durable underground, difficult to burn and is used for sleepers and many other purposes. Market value, from 9s. per hundred feet, wholesale.

FLOODED GUM (*Euc. rostrata*)—Diam., 40 to 48 in.; height, 80 to 100 feet. A majestic tree inhabiting the rich alluvial flats upon the banks of the rivers, and in such localities has a pillar-like trunk clear of branches for three-fourths of its entire height. The timber is of high repute for strength and durability. The market value at the present time is from 8s. to 9s., wholesale.

STRINGY BARK (*Euc. fibrosa*)—Diam., 18 to 36 in.; height, 40 to 75 feet. Timber much prized for flooring boards, and building generally; having considerable strength and durability. Market value, 7s. per hundred feet, wholesale.

MORETON BAY ASH (*Euc. tesselaria*)—Diam., 14 to 25 in.; height, 30 to 60 feet. Timber of a brownish colour, not hard but tough; highly spoken of for building purposes in the northern parts of the colony. Market value, 8s. per hundred feet wholesale,

SILVER-LEAVED IRONBARK (*Euc. melanophloia*).—Diam. 18 to 24 in. ; height, 60 to 70 feet. With a blackish, persistent, deeply-furred bark, the foliage more or less glaucous or mealy white ; timber used for railway sleepers, fencing and other purposes. Market value, 10s. per hundred feet, wholesale.

WHITE NARROW-LEAVED IRONBARK (*Euc. crebra*).—Diam. 20 to 36 in. ; height, 70 to 90 feet. With a hard, blackish, rough, persistent bark ; the timber is hard, tough, durable, and valuable for building purposes. Market value, 9s. per hundred feet, wholesale.

CITRON-SCENTED GUM (*Euc. citriodora*).—Diam, 18 to 34 in. ; height, 40 to 70 feet, with a smooth bark. The foliage emits a strong odour of citron when rubbed. Timber, hard, durable, and used for house carpentry.

Euc. globulus, the noted blue gum of N. S. Wales, Victoria, and Tasmania (one of the largest trees in the world) is conspicuous by its absence in Queensland.

WHITE TEA-TREE (*Melaleuca leucadendron*) (Linn.)—Diam., 24 to 40 in. ; height, 40 to 80 feet. Timber hard, close-grained, excellent for posts in wet ground, and piles for wharves, and is said to be imperishable underground.

BOX (*Tristania conferta*).—Diam. 35 to 50 in. ; height, 80 to 100 feet. A large spreading tree, with a smooth brown, deciduous bark and dense foliage ; very generally distributed on open forest ground. The timber is much prized for its strength and durability. Market value, 9s. per hundred feet. Used in ship-building ; ribs of vessels from this tree have lasted unimpaired for thirty years and more.

TURPENTINE (*Syncarpia laurifolia*).—Diam., 40 to 96 in. ; height, 70 to 100 feet. A magnificent tree, with a rough persistent bark on the trunk, but more or less deciduous on the branches. Timber valuable for piles and posts of timber fences ; very durable underground, and said to resist the *terrado navalis* in salt water. Market value, 8s. per hundred feet, wholesale. See N. S. Wales timbers, p. 173.

Lysicarpus ternifolius.—Diam., 18 to 24 in. ; height, 40 to 50 feet. A middle-sized tree, with a soft, thick, fibrous bark. Timber, is hard, heavy, and elastic, prettily marked and used for cabinet work, but more particularly for piles, bridges, railway sleepers, &c.

BEECH (*Gmelina*).—Diam., 24 to 42 in. ; height, 80 to 120 feet. Found in the scrubs bordering the rivers on the coast. A very useful timber, strong and durable, and easily worked ; it does not expand by damp or contract by dry weather ; much prized for the decks of vessels and the flooring of verandahs.

LIGNUM VITÆ (*Vitex lignum vitæ*).—Diam. 20 to 24 in ; height, 50 to 70 feet, A tree of general occurrence in the moist low scrubs bordering the coast. The timber is hard, close-grained, and of a blackish colour ; used by cabinet- makers, &c.

COACH-WOOD (*Ceratopetalum apetalum*).—Diam., 24 to 36 in.; height, 70 to 90 feet. A beautiful tree, with long cylindrical stem. Wood soft, light, tough, close-grained and of agreeable fragrance; it is good for joinery, cabinet work and coach-building.

BRIGALOW (*Acacia excelsa*—Diam., 20 to 30 in.; height, 50 to 80 feet. It covers immense tracks of rich scrub land; the wood is hard close-grained, of a dark colour, and is used for building purposes, fencing, &c.

DON (*Lagunaria Patersoni*)—Diam., 18 to 30 in.; height, 40 to 60 feet. Found on the alluvial river banks of the Don River, Port Denison; timber white, close-grained, easily worked, and used for building purposes.

STRENGTH—The following list, shows the *transverse breaking strains of Queensland Timbers*, chiefly used in construction. They have been selected from a much larger number of experiments made during the building of the bridge at Maryborough, in which ironbark and spotted gum only were used.

See "Notes on the Strength of Queensland Timbers," by F. Brierley, C.E., Inspector-General of Roads, Queensland, as they appeared in the Australian Engineering and Building News, Nov. 1. 1879.

The weight was applied in the centre of samples *one inch square, resting on supports twelve inches apart, ends free:*—

	No. of Tests.	Breaking weight, lbs.
Ironbark, four kinds	16	888
Spotted Gum (*Euc maculata*)...	5	1305
Grey River Gum (*Euc. saligna*)	4	983
Australian Beech (*Gmellina*)	2	442
Turpentine (Fraser Island)	1	1041
Flooded, or Red Gum (*Euc. rostrata*) ...	6	785
Red Cedar (*Cedrella toona*)	2	443
Kauri Pine (*Dammara robusta*)	2	460
Hoop Pine (*Araucar*)...	4	568

The specimens tried were the best of their kind, moderately seasoned, having been cut a few months only.

Discrepancies. Comparing the three sets of experiments on the breaking weight of timber, viz, the above in Queensland and two in Sydney, as per pp. 162 and 176, it will be seen that great discrepancies exist. In the Queensland timbers, the 16 ironbark specimens were evidently inferior compared to the others, while the specimens of spotted gum were exceptionally good. In the experiments at Sydney by Mr. J. W. Dunlop, the ironbark specimens appear to be far above the average. Taking into account the well-known properties of ironbark and spotted gum, the experiments at the Sydney Mint are the most reliable, and from these I have compiled the Tables showing their relative strength. Even if all the samples experimented upon were taken from trees of the same age, grown in similar soil and climate, felled at the same

season, taken from similar portions of the trunk, seasoned in the same manner and for the same time, the results might not be the same; because colonial timbers, called by the same name in the different colonies, are found not to be identical when compared by botanists; hence the botanical name and properties are the only reliable data in cases of identity.

STRENGTH OF TIMBER.—On page 162 I have given the result of the most reliable experiments hitherto tried upon the strength and elasticity of some of the Australian hardwoods. The pieces tried were well seasoned, picked specimens, $1\frac{3}{4}$ inches square, supported at each end with a clear bearing of 4 feet, the weight being applied in the centre, and with the following results:—

	Breaking weight in lbs.	Weight in centre without injury in lbs.	Ultimate deflection in inches.
Box, mean of 4 experiments ...	1092 ...	658 ...	0.90
Iron bark ditto	1022 ...	742 ...	1·31
Spotted gum ditto	896 ...	560 ...	0·85
Stringy bark ditto	812 ...	560 ..	1·20

The above experiments were made with the view of comparing the results obtained by Professor Barlow, at Woolwich Dockyards, as given on page 162 and were similarly conducted in every essential particular.

WESTERN AUSTRALIA.

So little is generally known or published of the building materials of this colony that I will refer only to one of its noted timbers, reserving a more general account to a future edition, if called for.

JARRAH (*Eucalyptus marginata*).—Of straight growth; diam. up to 19 feet, and height up to 200 feet; like red gum and inferior box it is liable to decay at heart, and grows chiefly on ironstone ranges. Timber—red, very hard, heavy and close in grain; somewhat greasy, and takes a good polish; it bends without steaming, and is uninjured by iron fastenings. Its greatest and best known feature is its durability and freedom from the attacks of the *teredo*, in this respect probably surpassing any other known timber. It is stated that Jarrah piles have been removed, perfectly sound, after being 35 years exposed to the teredo; it is used for shipbuilding, the vessels not requiring metal sheathing; it is much used for railway sleepers, piles in wharves, jetties, &c., and is largely exported to India, &c. Like red gum it is ranked as first class at Australian Lloyds', A for 12 years. Its crushing weight per square inch is 7165 lbs., its tensile strength has not as yet been definitely determined. It was awarded the first order of merit at the Vic. Internat. Exhibition in 1880. See Notes upon Civil Engineering by F. Campbell, C.E., in the Australian Engineering and Building News June 1, 1881, and Aug. 2, 1880, as to durability, &c.

Extract from the Jurors' Report of the Victorian International Exhibition.

Next to the Indian wood collection, for numerical extent of different kinds,, stood the superb series of timber specimens displayed by *New South Wales*; as a whole, the collection occupied a foremost position for the size and soundness of the samples, while the fitness of many of the select species for ornamental furniture, and for many sorts of implements, was well demonstrated by the careful planing and polishing to which these wood exhibits had been subjected. Nevertheless, as in the case of the rather numerous variety of excellent specimens of woods from Queensland, any considerable traffic has hitherto been limited to comparatively few species; it remains to be ascertained what sorts occur sufficiently frequent to enter the market in quantity and at moderate price, and how many kinds can compete in ease of working, durability, or beauty of appearance, with the timber of the red cedar, iron bark, and other leading *eucalypti*, blackwood, acacia, araucaria, kauri, and podocarpus pines, yellow wood, tulip wood, gmelina, grevillea, maba ebony, and a few other sorts of mercantile timbers of Eastern Australia; the question arises, also, as to which species of trees are most rapid in growth, and require the least expensive treatment. For entering the domain of forest culture, as we proceed in Australia to the cooler southern latitudes, the bewildering diversity of the tree vegetation of the intra-tropic and sub-tropic zones give way to a far more limited number of timber species—they are no longer counted by hundreds, the aspect of the forests becomes more monotonous, and gregarious species replace the scattered kinds; but what is lost in variety is gained by the abundance of the fewer forms. Fortunately many of them are excellent in their way for the purposes of industrial life. Thus *Victoria* can pride itself on its masses of the famous rapidly-growing blue-gum tree, its easily-worked stringy-bark tree, its red-gum and ironbark trees of extraordinary durability of timber, its box, eucalypti of several select kinds, singular for the toughness of their wood. Our famous blackwood tree is not only interspersed in the forest vegetation, but also still abounds in many parts of the open country, yielding a magnificent furniture wood; in some of the higher altitudes and cooler valleys the evergreen beech forms forests of its own. The eucalypti, however, predominate decidedly in Victorian tree vegetation, numbering many important species, and on their descriptive and technological elucidation a special volume has been published by the Government botanist, whereby a fair guide through the eucalyptus vegetation of Victoria, and of all the other Australian colonies, can be gained. *Tasmania and South Australia* participate in many of the species of timber trees, which form the native wood resources of Victoria; but while South Australia (in its intra-tropic portion) possesses hardly any timber vegetation peculiarly its own, Tasmania can boast in its vast forest regions, of its endemic splendid Huon and celery-topped pines; and here alone, beyond Victoria, have the blue-gum tree and the beech their home,

though the almost incomparable red gum tree does not pass Bass's Straits. Many of the timber samples from Tasmania were of great size and particular excellence. *South Australia*, from its young, but well organized and well supported Forest Department, will do well to send large displays of introduced timbers to future exhibitions. *Western Australia*, so strikingly singular in most of its vegetation, possesses likewise throughout its main forests, features quite its own, an enormous area being covered by the jarrah (eucalyptus), which tree has become world-famed for the durability of its timber. Also confined to the west of Australia are the York gum-tree, the tuart and the yate, all counting among the most lasting woods, though, unlike the jarrah, they have not yet come into any regular export trade. The karri, although not so durable, is also of importance, when gigantic dimensions of timber are an object. On the "Forest Resources of *Western Australia*," a special and illustrated publication has been issued by a member of this jury; and it may also in this instance be recommended that the leading eucalyptic timber should be transferred from thence to the forests of the south-eastern colonies—a recommendation which forced itself still more on our attention when we noticed the huge planks, the uncorroded, though long submerged piles, and the variety of wrought-wood samples in the Western Australian Court. Still more isolated than Western Australia stands *New Zealand*, in its timber vegetation peculiar in every respect, a circumstance all the more remarkable when the short distance which separates the great northern island from south-eastern Australia is considered. What is so much wanted here, as a natural local resource, namely, pine timber, forms in New Zealand a large portion of the forests, though several evergreen beeches, with a few other kinds of trees, constitute in some localities main portions of the woods. The kauri, miro, totara, and matai, are leading pine-trees there, representing a great forestral of wealth, enhanced by the large demand already existing in these southern colonies for decay-resisting pine-wood in naval architecture. The display of timber specimens from New Zealand was, as regards Kauri, truly magnificent.

WILLOW, although indigenous to Europe, has been largely planted at the homesteads of the Australian pioneers or squatters, on the banks of rivers, water holes, &c. It is light, pliant, soft, tough, and does not splinter. It is not easily burnt and is therefore fit for flooring, roofing, ladders, guard posts and fenders of wharves, &c. It is also well adapted for furniture and cricket bats. Its weight is about the same as cedar, 30 to 35 lbs. per cube foot.

NOTE.—In the above articles on the Building Timbers of Australia, I have omitted those trees generally less than 12 in. in diam., and also those that have been used for cabinet work only; known as fancy woods. The latter comprise most of the trees, many of which might be used for panels of joinery, inlaid work or parquetry flooring.

STONE, &c.,

Australian	Per cubic foot. lbs	No of cubic feet per ton.
Oamaru, Adelaide, Waurn Ponds and Geelong freestones ..	134	16½
Kyneton sandstone	138	16¼
Western Port, do.	148	15¼
Spring Bay ditto ..	140	16
Point Ventenet, do.	145	15½
Stawell Sandstone..	154	14½
Sydney sandstone ...	140	16
Bluestone (basalt) ..	161	14
Granite, grey or red...	167	13½
Marble, Adelaide ...	169	13¼
Rubble, ballast and metal, see Index		
Brickwork, see Index	124	18
Sand (sharp) about ...	95	23
Clay, mild brick earth	120	18⅔
,, strong and stiff	135	16½
Mortar, dry	93	24

English, &c.		
Bath (Oolite) ...	140	16
Portland, do.... ...	153	14⅔
Craigleith, sandstone	149	15
Caen, French freestone	132	16½
Granite, Aberdeen	164	13⅔
Marble, Carrara ...	170	13¼
Cast iron	464	
Wrought iron ...	477	

FLAGGING.

In.		Ft. sup. p. ton.
2	Yorkshire	86
2½	Do.	70
3	Do.	57
2	Arbroath	87
2½	Caithness	68
1	Slate, Welch	160
1½	Do.	107
1	Marble slabs, black ..	165
1	Do., white or veined	160

AUSTRALIAN FLAGGING

In.		Ft. sup. p ton.
4	Sydney sandstone ..	48
3	Sawn bluestone... ...	56
2½	Ditto	70
2	Ditto	84

TIMBER.

British, &c.	Per cubic foot. lbs.	No of cubic feet. per ton.
Red or white American pine (seasoned	34	66
Yellow pine, Baltic, (seasoned)... ..	35	64
Red pine, Riga do....	33	62
Pitch pine (seasoned)	39	57½
Cedar, Spanish American (seasoned) ...	30	75
Mahogany, Spanish ..	34	66
Mahogany, Honduras or Baywood ...	40	56
Oak, just felled ...	68	33
Oak, of commerce ...	57½	39
Oak, well seasoned ...	48	47
Elm, just felled ...	58	38
Elm, well seasoned ...	42	53
Teak, Indian, do ...	42	53
Australian.		
Cedar, N. S. Wales, market cut ...	36	62
Kauri Pine, New Zealand market cut	40	56
Hardwood, market cut, about	56	40
Iron bark and box, just felled	70	32
Blue or red gum, do.	65	34½
Stringy bark and blackwood, do. ...	64	35

WATER, *rain or pure*, at 63 deg.
62½ lbs., or 6¼ gallons, = cubic ft.
10 lbs., or 277¼ c. ins., one gallon.
35·85 c ft., or 224 gallons, one ton.
8 gallons or 1 ft. 3½-12ths cube, one bushel.

ROOFING, *per square.* Cwt.

Slates, 4 in. lap 6
Palings, half 5 or 6 ft., 3 to 4
Shingles ... ... 2½ to 3
Zinc, plain, 8 to 12 gauge ⅜ to 1¼
Gal. corrugated Iron, 26 and 24 gauges lapped 2 cors.... ... ... 1 to 1½
Lead—add 00 to the lbs. per foot for the lbs. per square (multiply by 100) and allow for laps.
The rolls are generally about 30 feet by 7 feet.

FLOORS, *per square.* Cwt.

1 in. wrought Amer. red or white pine.. 2
1⅛ in. wrought Baltic red pine.. .. .. 2⅛
1 in. ditto pitch pine... .. 2¼
1 in. Colonial pine, T. & G. 2½
Ditto, hardwood, dressed .. 4
FLOORS should be made strong enough to bear the following weights per foot sup. The scantlings may be calculated from the Tables of hardwood, &c. See Index.

Cwt.

Private or ordinary rooms, etc. from 1 to 2
Public rooms for meetings, halls, theatres, etc. 2½
Warehouses or stores, railway or wharf platforms or landings, road bridges, or railway *over* bridges ... 3
Railway bridges or viaducts 4

SUNDRIES.

Laths, split hardwood or sawn pine, 4 ft. p M. 2 to 2½
POSTS and RAILS, viz., 25 posts and 75 rails, market, cut ... ... 30 to 35
PALINGS, 5 ft. per C., 3 to 4½
,, 6 do. do. from 4 to 6
SHINGLES, hardwood, p. M. 3

SUNDRIES.

Washing coppers each see Index
Vulcanized Indian rubber ,, ,,
Rod and bar iron, see Index
Metals, per sup. ft., see Index.
Ropes and chains, see Index.
Cast iron pipes, see Index.

CAST IRON SPOUTING. lbs

4 in. ½ round p. length of 6ft. 16
4½ in. do. do. 17
5 in. do. do. 18

	2 in. lbs.	2½ in. lbs.	3 in. lbs.	4 in. lbs.
Cast iron down pipes (6 ft.)	16	20¼	23	38¼
Swan necks ea.	3¾	4	7½	11
Heads, each..	7	7½	8	41
Shoes, each ..	1¾	2¾	4	7

METALS, *per cubic inch.*

	lbs.
Iron bar	0·279
Iron or tin, cast ...	0·263
Steel, hard	0·2827
Lead	0·4105
Copper, cast	0·3178
Brass, cast	0·3036
Zinc, cast...	0·26
Gun metal	0·31

LIME, CEMENT, &c.

	lbs.
Lime, Heads, p. bag 3 bus.	180
Do. Geelong roche, do. ..	200
Cement, Portland, p. cask of 3½ bushels	430
Cement (Keene's marble p. cask of 4 bushels ...	300
Plaster of Paris, p. ck. 3½ bushels	310

BRICKS, *per cubic foot.* lbs.

London stocks	115
Welsh or other fire bricks...	150
Melbourne, white or red ...	131
Ditto, white pressed ...	136

PAVING TILES, ETC., *each* lbs.

Australian 9 in., 7lbs.; 12in.	14
Earthenware drain pipes, see In.	

Weights, Lbs. to Tons with their Relative Prices.

lb. or 1.	Stone or 14 lbs.		Qr. or 28 lbs.			Cwt. or 112 lbs.			Per ton or 2240 lbs.		
d.	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*	£	*s.*	*d.*
¼	0	3½	0	0	7	0	2	4	2	6	8
½	0	7	0	1	2	0	4	8	4	13	4
¾	0	10½	0	1	9	0	7	0	7	0	0
1	1	2	0	2	4	0	9	4	9	6	8
1¼	1	5½	0	2	11	0	11	8	11	13	4
1½	1	9	0	3	6	0	14	0	14	0	0
1¾	2	0½	0	4	1	0	16	4	16	6	8
2	2	4	0	4	8	0	18	8	18	13	4
2¼	2	7½	0	5	3	1	1	0	21	0	0
2½	2	11	0	5	10	1	3	4	23	6	8
2¾	3	2½	0	6	5	1	5	8	25	13	4
3	3	6	0	7	0	1	8	0	28	0	0
3¼	3	9½	0	7	7	1	10	4	30	6	8
3½	4	1	0	8	2	1	12	8	32	13	4
3¾	4	4½	0	8	9	1	15	0	35	0	0
4	4	8	0	9	4	1	17	4	37	6	8
4¼	4	11½	0	9	11	1	19	8	39	13	4
4½	5	3	0	10	6	2	2	0	42	0	0
4¾	5	6½	0	11	1	2	4	4	44	6	8
5	5	10	0	11	8	2	6	8	46	13	4
5¼	6	1½	0	12	3	2	9	0	49	0	0
5½	6	5	0	12	10	2	11	4	51	6	8
5¾	6	8½	0	13	5	2	13	8	53	13	4
6	7	0	0	14	0	2	16	0	56	0	0
6¼	7	3½	0	14	7	2	18	4	58	6	8
6½	7	7	0	15	2	3	0	8	60	13	4
6¾	7	10½	0	15	9	3	3	0	63	0	0
7	8	2	0	16	4	3	5	4	65	6	8
7¼	8	5½	0	16	11	3	7	8	67	13	4
7½	8	9	0	17	6	3	10	0	70	0	0
7¾	9	0½	0	18	1	3	12	4	72	6	8
8	9	4	0	18	8	3	14	8	74	13	4
8¼	9	7½	0	19	3	3	17	0	77	0	0
8½	9	11	0	19	10	3	19	4	79	6	8
8¾	10	2½	1	0	5	4	1	8	81	13	4
9	10	6	1	1	0	4	4	0	84	0	0
9¼	10	9½	1	1	7	4	6	4	86	6	8
9½	11	1	1	2	2	4	8	8	88	13	4
9¾	11	4½	1	2	9	4	11	0	91	0	0
10	11	8	1	3	4	4	13	4	93	6	8
10¼	11	11½	1	3	11	4	15	8	95	13	4
10½	12	3	1	4	6	4	18	0	98	0	0
10¾	12	6½	1	5	1	5	0	4	100	6	8
11	12	10	1	5	8	5	2	8	102	13	4
11¼	13	1½	1	6	3	5	5	0	105	0	0
11½	13	5	1	6	10	5	7	4	107	6	8
11¾	13	8½	1	7	5	5	9	8	109	13	4
12	14	0	1	8	0	5	12	0	112	0	0

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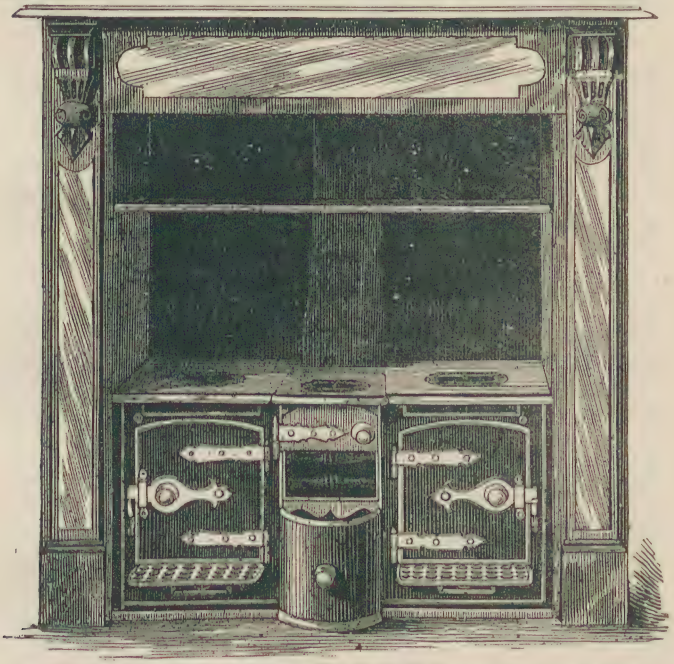

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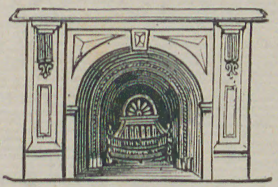

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